



Telecommunications Authority of Trinidad and Tobago

**NATIONAL POLICY ON CABLE TELEVISION
NETWORKS AND SERVICES**

DRAFT

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1.0 EXECUTIVE SUMMARY

The Government of the Republic of Trinidad and Tobago (GoRTT), through the Telecommunications Authority of Trinidad and Tobago (TATT), has embarked on a plan to liberalize the telecommunications sector. A part of this plan is the introduction of competition in the cable television market in order to provide the public with a choice of providers of cable television and related services. More precisely, the policy will specify the modalities that will be instituted to widen the range of services offered on cable TV networks and encourage improvement in service quality at more affordable prices.

Cable TV networks have the capacity to provide broadband services including voice, video and data at high speeds and can be classified among broadband networks. Broadband networks afford high-speed access for a number of developmental purposes such as education and training, business and industry, health and leisure etc. Of significant importance, rural and remote communities that are relatively disadvantaged in respect of the mainstream of the economy will be able to participate more actively in the social, economic and intellectual life of the nation through opportunities that can be made available via broadband technologies.

GoRTT is intent on transforming the country into a developed society by the year 2020. Towards this end, the ICT sector has been entrusted with a serious and fundamental responsibility to provide capacity for rapid online exchanges that are imperatives for socio-economic modernization in a global village. Cable TV networks are one of the media that enable such high-speed information exchanges to all areas in the country.

In the circumstances, cable TV network operators and/or service providers will be afforded the opportunity to apply for concessions and where applicable licences for cable TV and other broadband services that can be transmitted via cable TV networks. Concessions will be applicable to fixed-line (wired) and wireless networks while licences shall only apply to wireless networks. The services for which concessions and licences shall be granted are listed hereunder:

- Cable Television (video)
- Internet access (data)
- Telephone (voice)
- Network services (ISP, PTO etc.)

A future is envisaged where consumers will have the preference of using a single interface to access multiple communications services.

2.0 POLICY OBJECTIVES

This policy is developed for cable TV network providers and cable TV service providers. It is guided by the National Spectrum Policy, the National Frequency Allocation Table (FAT), the National Policy on Broadcast and the Broadcasting Industry, the Broadcast Code and the National ICT Plan.

As part of GoRTT's plan to liberalize the telecommunications sector and introduce competition in the cable TV market, this policy seeks to:

- a) Increase the range, scope and quality of telecommunications services available to the public by providing the public and the business community in Trinidad and Tobago with a matrix of choice in cable TV and broadband (video, voice, data) services by fully liberalizing the cable TV market in the country.
- b) Structure the liberalization process in a manner that will realize more competitive prices and access to broadband telecommunication services to the public.
- c) Create an environment which encourages investment in the telecommunications sector as a means to improve the quality and expand the range of services delivered in the country, in particular to the underprivileged and remote communities.
- d) Honour the country's commitment as a signatory to the World Trade Organization (WTO) under the General Agreement of Trade in Services (GATS) for the telecommunications sector.
- e) Improve the Digital Access Index (DAI) of this country.
- f) Assist in bridging the urban and rural digital divide.

The development of this policy is based upon the following set of principles:

- 1) Creating effective competition to facilitate affordable access to information through diversity and plurality of telecommunications media.
- 2) Facilitating greater access to broadband services.
- 3) Connecting villages to ICTs and creating access points.
- 4) Connecting schools of tertiary, secondary, primary and pre-school institutions to ICTs.
- 5) Connecting scientific and research centers to ICTs
- 6) Connecting public libraries, cultural centers museums, post offices, medical centers and hospitals to ICTs
- 7) Adapt primary and secondary school study programmes to fulfill the objectives of the information society as conceived in vision 20/20

An objective for introducing competition in the cable TV market is to reduce the digital divide in this country. This implies for our nation, narrowing the gap between those who have access to ICTs and those who do not. The digital divide is predominantly seen between urban and rural areas where access to ICTs is limited.

For the purpose of this policy, the term Subscription TV is understood as television programming provided by the traditional cable TV operators (wired or wireless) and Satellite (Direct-to-Home) TV operators.

A cable TV service provider is the owner or operator responsible for the provision of services, identified in the Policy and at minimum shall include cable TV, by which any customer may access such services. A cable TV network operator/provider is the owner or operator who installs, operates and maintains all facilities required for the provision of cable TV and/or broadband services by the said network.

3.0 BACKGROUND

Cable TV was first introduced in Trinidad and Tobago in 1990 and between 1990 and 1995 a total of six companies were granted licenses. The current Cable TV market can be described as a virtual monopoly with the Cable Company of Trinidad and Tobago (CCTT) as the dominant operator in Trinidad and TRICO Industries Limited in Tobago. There also exists a monopoly in the satellite (Direct-to-Home) TV market with DirecTV as the sole provider of satellite subscription services in this country.

Predominantly in Trinidad, are a number of unlicensed (illegal) cable TV operators providing services to rural and remote communities. These operators have been in existence since the introduction of cable TV in the Trinidad and Tobago. Services offered by these operators have been traditionally at a lower cost when compared to licensed operators.

The current cable TV market consists of service providers only using fixed-line (wired) facilities, while the use of wireless technologies is virtually unexplored. At the time of inception, cable TV operators took the step and pioneered fixed-line services, partly due to the less than substantial availability and popularity of wireless technologies. Compared to the design and implementation of a nationwide point to multipoint wireless network (at that time), the ease to stringing lines across existing poles presented a more feasible method.

In respect of wired Cable TV, in principle, the Trinidad and Tobago Electricity Commission (TTEC) only allowed one additional cable to be placed on their poles for Cable TV providers. This resulted in a zoning approach used in awarding licences for coverage of Trinidad and Tobago. Prior to the promulgation of the Telecommunications Act, 2001 and the introduction of TATT, these licenses were granted under two classes: national or community. These licences were issued under the now repealed Wireless Telegraphy Ordinance.

The incumbent Public Telecommunication Operator (PTO), the Telecommunications Services of Trinidad and Tobago (TSTT) is currently the dominant provider of broadband services in Trinidad and Tobago. A few small-scale companies provide broadband solutions but not to the general public.

Open access to cable TV is increasingly seen as a platform for Internet access service competition. The two most widely used technologies, in terms of subscriber base, are DSL and cable modem, comprising 57% and 37 % respectively of world broadband subscribers at the beginning of 2004.

4.0 POLICY CONSIDERATIONS

The cable TV subscription services offered through the network may include, but are not limited to:

- Cable television
- Telephony (voice over cable / VoCable and FAX)
- Video on demand
- Interactive television
- High speed Internet
- Other broadband services

4.1 Concessions and Licenses

Concessions will be granted to suitable applicants for fixed-line and wireless cable TV networks and/or service providers. Suitable applicants may include current cable TV operators, unlicensed operators and future operators. In accordance to Sections 21 of the Telecommunications Act, 2001 all concessions will be treated as Public Telecommunications Service, Broadcast Service and Public Telecommunications Network.

In the case of wireless cable TV operators, licences will be required for all spectrum used for channel capacity and network operation subject to availability of adequate frequency bands. Channel assignments and bandwidth allocations for wireless cable TV will be identified in the relevant Spectrum Utilization Policy and associated Frequency Channel Plan.

4.2 Network Build-out

Build-out of network to rural and remote communities will be encouraged through incentives including:

- A reduction in Universal Service Obligation (USO) for identified coverage areas.
- Temporary waiver or reduction of licence fees for parts of wireless network penetration into such communities.

GoRTT will put measures in place to reduce the existing digital divide in the country consequent upon distance and/or difficult terrain. In order to ensure remote communities are afforded fair and equitable opportunities to ICT access and are not overlooked or disadvantaged by service providers whose prime concern is to serve the more economically viable market segments, network build out to disadvantaged communities shall be encouraged.

The Authority shall identify these rural and remote communities to be approved by GoRTT for system build-out and/or expansion.

Broadband Subscribers by Technology

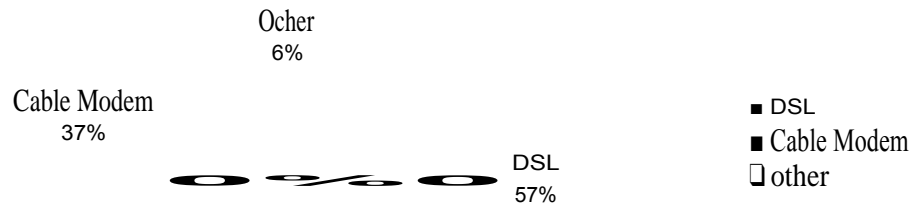


Figure 3.0 — World Broadband Subscribers at beginning of 2004

Source: ITU and OECD

The current market structure for subscription television services in the country is provided below in Table 3.0

Company	Service Region	No. of Subscribers approximately	Market Share
Cable Company of Trinidad and Tobago (CCTT)	Trinidad	91,000	84.9%
TRICO Industries Limited	Tobago	9,600	9.0%
DirecTV	Trinidad and Tobago	4,100	3.8%
Unlicensed Operators	Trinidad	2,500	2.3%

Table 3.0 — Current Subscription TV Market Share

Based on the market share alone, the cable TV market can safely be categorized as a monopoly both in Trinidad and in Tobago. As a result of this cable prices have been increasing rapidly since 1995. Table 3.1 provides an overview of incremental prices experienced over time with respect to subscription TV services.

Company	Package	Price	Year
Cable Company of Trinidad and Tobago	69 channels	TT\$197.40	2004
	69 channels	TT\$188.00	2002
	63 channels	TT\$115.00	1994

TRICO Industries Limited	69 channels	TT\$123.00	2004
DirecTV	34 channels	TT\$130.41	2004
Unlicenced Operators	56 channels	TT\$100.00	2004
	8 channels	TT\$100.00	1991

Table 3.1 - Pricing of Subscription TV Services

4.3 Convergence

Convergent networks have the capacity to transmit voice, video and data (in a digital form) through a common medium. At the end-user interface, another form of convergence can take place where equipment allows access to TV, data, telephony and other broadband services. With no limit placed on Cable TV operators in providing cable TV services, greater ICT development can be achieved through this broadband infrastructure. Broadband networks bundle all these applications into one package for the subscriber resulting in end-user convergence. Bundling of services allows for single package pricing i.e. no separate billing for cable, telephone and Internet (video, voice and data) services.

4.4 Market Competition and Pricing

Without competition the consumer does not have a choice of service provider and therefore must accept whatever service quality is offered by the monopolist. Liberalizing the cable TV market will cause competition among providers of a range of telecommunication services.

4.5 Piracy and Illegal Operators

GoRTT is mindful of the obligations by all service providers and consumers to refrain from copyright infringements and the use and proliferation of illegal material. To this end, the piracy of any programming material for the provision of cable TV services will be discouraged. Service providers shall therefore be required to provide evidence of all programmes sources and adhere to authorized subscription of such material, in accordance to the terms and conditions of the concession.

Unlicensed (illegal) cable TV operators currently provide cable TV services to rural and remote communities and a more affordable price than their licensed counterparts. The networks used for the established subscriber base can provide cable TV and broadband services in accordance to the objectives of this policy. In this respect, these unlicensed operators are the only current source of competition, although illegitimate, in the cable TV market for communities that they serve. The Government is therefore intent on regularizing the unlicensed cable TV operators in the country. The regularizing process will be in accordance with the Policy and Regulations as regards to concessions and licences.

5.0 APPLICATIONS

Information and communication technology is an important infrastructure for the cultural, economic and intellectual development of any society. In the circumstances, initiatives should be taken to promote greater ICT access to the public, especially in rural and remote regions.

Globally, cable TV systems are increasingly evolving into platforms for other broadband services such as high-speed Internet access and voice telephony. It is therefore important to national development to allow cable TV operators to provide internet access, telephony and other broadband services, or permit them to provide access through their networks to competing ISPs, PTOs and other service providers.

The goal here is to encourage the use of cable TV medium to expand the ubiquity of information and communication by increasing the number of network operators and service providers. A future is seen in which consumers will use a single interface to access all communication services - voice, video and data.

5.1 Digital Access Index (DAI) – Redefining USO

The International Telecommunications Union (ITU) embarked on the first global index to rank ICT access, based on data from 178 economies. The Digital Access Index (DAI) measures the overall ability of individuals in a country to access and use information and communication technologies (ICTs).

The DAI allows countries to compare their ICT status with others, measure progress and set targets with respect to ICT development. A complete list of countries and their DAI ranking is given in Appendix 2.

An overall understanding of the DAI and its fundamental factors is provided in figure 4.0

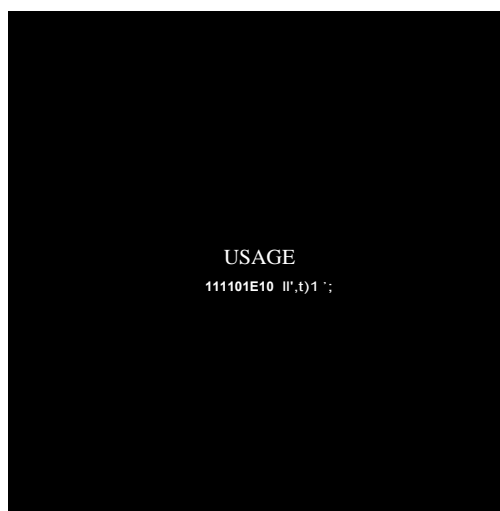


Figure 4.0 Fundamental factors of DAI

Source: ITU-D DAI Presentation Chapter 5 2003 World Telecommunications Development Report

The four fundamental factors shown in figure 4.0 of the DAI indicate the extent to which the society at large access and use ICT services. Trinidad and Tobago currently has a DAI of 0.53, which places this nation in the class of upper-access economies with respect to ICT. In comparison to our Caribbean counterparts, this country is currently ranked below Bahamas, St. Kitts and Nevis, Antigua & Barbuda, Barbados and Dominica.

With the introduction of more cable TV operators offering broadband services, an improvement in the DAI index is likely in Trinidad and Tobago. This will be translated into improvement in Universal Service throughout the country.

Open access to ICT through cable TV networks is likely to affect the DAI factors in the following ways:

Quality

- Cable TV operators offering broadband services will widen opportunities for **broadband subscribers**.
- A Cable TV network used to provide broadband services, in particular high speed Internet, will require a greater capacity for **international internet bandwidth**.

Infrastructure

- Cable TV telephone subscribers (voice over cable) will add to the number of **fixed telephone subscribers**. The infrastructure for fixed line telephone will grow as a result of increased telephone subscribers on a wired cable TV network.

Knowledge

- Cable TV network coverage, with special consideration to penetration into rural and remote communities, will increase opportunities for distance learning, video conferencing and information access for primary, secondary and tertiary education of the population.

Affordability

- Competition in the Cable TV market and consequently for broadband services, will result in competitive **prices** as for voice, video and data services.

Usage

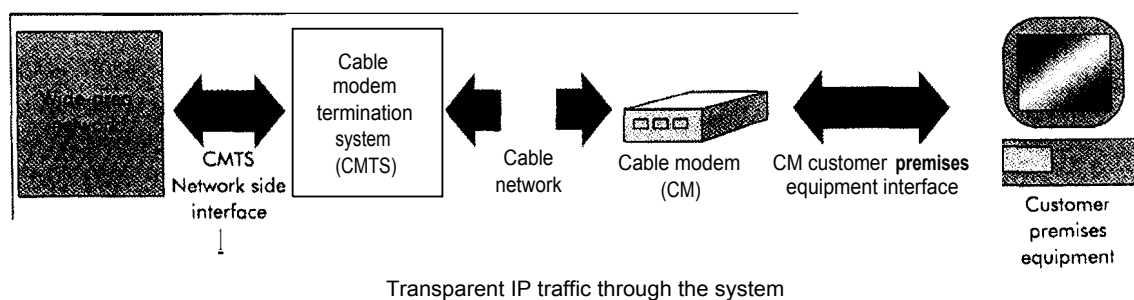
- Expanded broadband opportunities will increase the **number of users** in terms of the number of domestic subscribers as well as users in public locations such as Internet cafes, schools and ICT centers and the work place.

An enhanced DAI will indicate a country's ability to support and develop investment (locally and internationally) in the telecommunications sector. Therefore an improvement in the DAI index should benefit this nation in the following ways:

- Domestic and international investment into ICTs.
- Increased participation in the telecommunication market by the business community.
- A plural society with a greater public access and use of ICTs.
- More viable economy with respect to telecommunications in the local, regional and international market.
- Improvement in the delivery, access and use of e-services such as E-Health, E-Education etc.

6.0 CABLE TV BROADBAND SERVICES

It is necessary that such services be made available in Trinidad and Tobago at affordable rates. Broadband services are accessible through cable TV with the use of a cable modem. A typical configuration using cable modem on a network is shown below:



Source: ITU-T Recommendation J.122, ITU-T Study Group 9.

6.1 Telephony

Internet telephony services have been available for many years. This service can be provided seamlessly through a broadband connection with functionality that resembles the Public Switched Telephone Network (PSTN).

A single dedicated telephone line requires a capacity of 64 Kbps for a voice call. A cable modem may provide an upper limit of 52 Mbps. Using Voice Over Cable communication protocols e.g. the ITU approved standard – Data Over Cable Service Interface Specification (DOCSIS), a great number of subscribers can be provided cable TV in addition to telephone and other broadband services at the same time.

The cable TV industry has the potential to deliver a competitive choice for domestic telephone services as well as providing public call centers with the capacity required for telephony. This is, in part, attributed to the superior economic and technological advantages of Voice over IP (VoIP).

The liberalization of the domestic voice telephony market through cable TV facilities, wired or wireless, will be treated in accordance with Section 85 (9) of the Telecommunications Act, 2001 given that TSTT holds market for domestic public voice until June 30th 2005.

Appendix 4 provides a summary of countries where cable TV companies provide telephone services.

6.2 Video

Although telephone services over broadband networks have shown relatively high potential in terms of market share, video services such as video on demand, interactive TV and video conferencing also have important shares in the broadband services market. Subscribers can initiate through high-speed video services and with the use of web cams, communication with family and friends locally and internationally.

Businesses can invest in video conferencing as a means of establishing successful long distance meetings and conferences. With the television becoming the centerpiece of communication and entertainment for most communities, indications are that demand for interactive TV where a subscriber can request various programming at leisure is increasing.

6.3 Data

Internet access through Cable TV has major advantages over traditional telephone or "dial up" Internet access including:

- *Speed* - although the data rates vary depending on the number of online subscribers, users can expect data rates up to 100 times faster than conventional analog "dial-up" modems.
- *Connectivity* – cable TV Internet subscribers also benefit from the inherent "always on" property of the connection allowing for Internet service at any time.
- *Convenience* - cable TV Internet service is dedicated which means there is no "tie-up" or sharing of telephone line and no tedious Internet log on. Customers subscribing to both Cable TV and Internet services are provided these services simultaneously. Since these services are on separate data channels, a subscriber can use the Internet and watch TV at the same time.

As part of its policy to deepen the reach of internet access in communities nationwide, the Government of Trinidad and Tobago intends to widen the provision of cable services in the country.

7.0 CABLE TELEVISION NETWORKS

This policy seeks to encourage, where possible, co-location and sharing of network facilities. Conditions pertaining to such arrangements and in the case of interconnection between networks and with the Public Switched Telephone Network (PSTN) shall be detailed in the Interconnection Policy and Regulations and the Cable Television Networks and Services Regulations.

7.1 Wired Cable TV Networks

A wired Cable TV network requires that at no point would there be the use of terrestrial spectrum for the wireless transmission of information throughout the network or to the customer i.e. in the transmission and distribution phases of the cable TV system. At the headend, cable TV channels or programming may be obtained through the use of an earth station (VSAT) or any other means of authorized subscription to such material. Licences are required for any spectrum required for an earth station (VSAT) in accordance to Section 36 of the Telecommunication Act, 2001.

Spectrum emissions from cable TV networks at points of interconnection and cable coupling must be monitored and kept at a standard as detailed in the Regulations and/or Rules governing standards for quality of telecommunication services.

Wired cable has the property of a sealed environment with respect to the carrying of signals, which allows for non-interference with terrestrial and other signals. Therefore, it is possible for the fixed-line (wired) cable TV operators to deploy multiple cables, each of which contains separate signals.

Copper, coaxial and fibre are some of the media used by wired Cable TV operators to broadcast their signals. Appendix 3 summarises some of the technologies, data speeds and media used.

A wired Cable TV network may be symmetrical or asymmetrical. Symmetrical networks have the same capacity for upstream and downstream data and are typically used in private local loops or WAN type networks.

In the case of asymmetrical networks, there is a high downstream capacity provided by the network while the return path for upstream traffic may be provided via PTOs or any lower capacity network. An example is provided in Figure 6.0 where a Hybrid Fibre Coaxial (HFC) wired network is implemented.

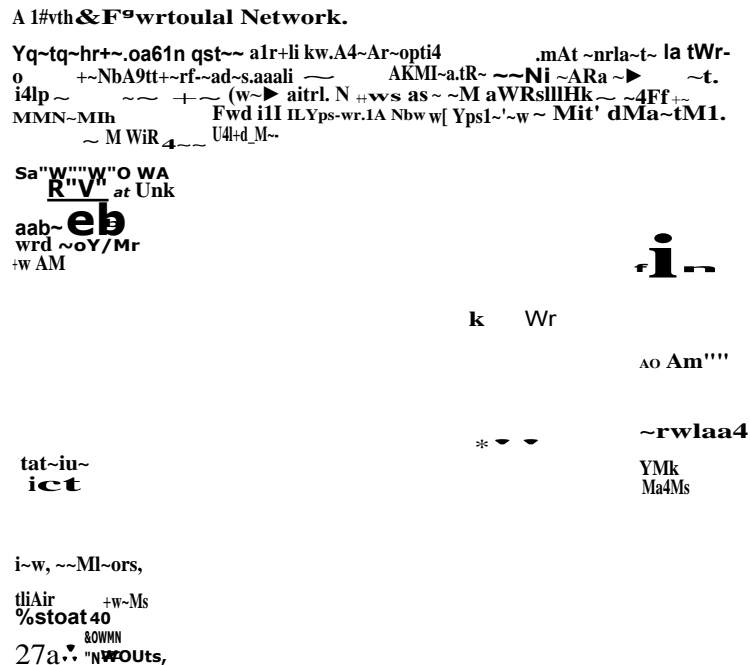


Figure 6.0 – Asymmetrical wired cable TV network

Possible avenues wired cable TV operators may explore, with respect to the laying down of network cables and facilities, include the common installation of cables on poles for the distribution and transmission phases with the possibility of underground cabling in any phase.

If installation of cables on TTEC and TSTT poles cannot be accommodated, then use of underground cabling must be explored. The benefits of underground cabling come as an esthetic solution and a reduction on environmental impact.

7.2 Fixed Wireless Cable TV Networks

Wireless cable television transmits information to subscribers using spectrum in its transmission and/or distribution phases. Except at customer premises, there is virtually no hard-wired cable required to connect the subscriber to the cable TV network. Each subscriber would be equipped with a small antenna, along with a converter or decoder, which enables viewing of cable TV programmes.

Historically wireless broadband services were provided asymmetrically with a telephone or "dial-up" return path used for upstream communication. With the evolution and advancements in technology, operators are transitioning to full duplex (two-way) wireless delivery of broadband services.

Wireless cable technology have introduced some key benefits such as:

- *Rapid Network build-out* - This network can rapidly introduce high-speed data services throughout a metropolitan area without the cost or delay of wired plant upgrades i.e. rather than stringing miles of fibre, coaxial or copper wiring, a wireless operator installs a headend and transmission tower(s) and is open for business.
- *Availability* - Wireless cable can be made available to remote areas, areas of scattered population and other areas where it is too expensive to build a traditional cable station or install poles for cable lines.
- *Affordability* - Due to the lower cost of building a wireless cable station(s), a lower cost base for cable TV and broadband services can be developed and cheaper rates for such services i.e. savings can be passed on to the customers.

A commonly used term for wireless cable TV is the Multi-channel Multipoint Distribution Service (MMDS). Conceived as a substitute for conventional cable television, wireless cable can be operated on a MMDS platform. Another platform for wireless cable TV, but at a much smaller point to multipoint service scale i.e. typically community based, is the Local Multipoint Distribution Service (LMDS).

MMDS is a broadcasting and communications service that normally operates in the ultra-high frequency (UHF) portion of the radio frequency (RF) spectrum between 2.1GHz – 2.9GHz. MMDS networks can provide high-speed Internet access, telephone and video services. LMDS typically operates in the 27GHz - 31GHz RF bands and can also provide similar services as its MMDS counterpart.

Notwithstanding the service type allocations made in the national Frequency Allocation Table (FAT) and the current spectrum occupancy, there is no technical reason prohibiting the use of any part of the RF spectrum for analog or digital MMDS / LMDS services.

The predominant limiting factors for use of MMDS / LMDS in any given RF band are the cost of the subscriber equipment, which is primarily driven by the number of subscriber units produced and the cost of technology used at the given frequency.

The higher the frequency, the more expensive the technology required operating at these frequencies. Commercial high-volume applications for analog or digital MMDS systems above 3GHz may be possible on a made to order basis.

Subject to availability of adequate frequency bands, spectrum required for wireless cable TV shall be made in accordance with the National Frequency Allocation Table and the Regulations. Identification of such frequencies shall be made in the Spectrum Utilization Policy and associated Frequency Channel Plan. The process for awarding spectrum will be detailed in the Request For Proposal (RFP) for Cable Television Networks and Services.

8.0 POLICY PRESCRIPTIONS

No telecommunications service provider will be allowed any unfair advantage in the provision of any service in the country. The Government is intent on restructuring the telecommunications market in the country to facilitate:

- a choice of affordable high quality telecommunication services
- technology neutrality i.e. non-preferential treatment of all technologies that have satisfied specified standards.

8.1 Concessions and Licenses

In this respect, the Government will grant new concessions / licences to providers for both fixed line (wired) and wireless cable TV network operators and service providers. Potential service providers should seek concessions and where necessary licences pursuant to Sections 21 and 36 of the Telecommunications Act, 2001.

Concessions will be granted in accordance with the type of network and services offered. The type of concession / licences granted will determine relevant fees payable as prescribed by the Authority in accordance with Section 22 and 37 of the Telecommunications Act, 2001.

The procedure for granting of concessions and licences will involve the invitation of applications to TATT via RFPs for wired and wireless Cable TV networks and services which will detail process for applications, evaluation, award of licenses / concessions.

The class of concession and as required licences shall be for the following:

- Cable TV only
- Cable TV and data services
- Cable TV and voice services
- Cable TV, data and voice services

(where broadband services include voice, video and high-speed data)

Concessions / licenses shall prescribe rights and obligations of holder, fees, process of revision of fees, compliance procedure and penalties. Revocation and renewal of concessions / licenses are subject to Sections 30, 31 and 39 of the Telecommunications Act, 2001.

8.2 Networks and Services

A cable TV network operator may lease partially or fully the network to any cable TV or broadband service provider or become a service provider directly. Such service providers will require a concession and may offer the following packages:

- Video only – Cable TV
- Video and Data – Cable TV and Internet
- Video and Voice – Cable TV and telephone
- Video, Data and Voice – Cable TV, Internet and telephone

GoRTT mindful that networks should be sufficiently unbundled so that service providers are only billed for those facilities that they require. Principles for facility sharing, co-location and pricing of such arrangements shall be prescribed in the Regulations.

Equipment and infrastructure required for network (wired and wireless) build-out are subject to the relevant authorisation and rights of way for:

- construction of any towers
- laying of overhead lines
- underground cabling
- all other facilities related to the network

from the Highways Division, Town and Country Planning Division and all pole, tower and land owners. Concessionaires are encouraged to consult the relevant Town and Country Planning Division Policies.

8.3 Piracy and Illegal Operators

in accordance to the Regulations and the terms and conditions of the concession, service providers shall provide evidence of all sources of programmes and adhere to authorized subscription of such material. Piracy of any programming material for the provision of cable TV services will be discouraged.

All unlicensed (illegal) cable TV operators will be required to apply for a concession to provide cable TV services in this country i.e. in order to continue operation. Service providers operating without a concession will be treated pursuant to Sections 65 of the Telecommunications Act, 2001. Unlicensed operators will also be provided the opportunity to apply for a concession for network and services as identified in the Policy, via the RFP.

8.4 Pricing

The market will determine price of services as competition develops. In the initial stage, a cost based pricing regime will be developed by the Authority in conjunction with service providers.

TATT shall institute an equitable and commercially fair pricing mechanism, until such time that market forces enable a similar structure. The criteria for equity and commercial justice are determined by the relationship between service rates and actual efficient cost of cable TV and broadband services offered by the network.

8.5 Standards

The cable TV network operator and service provider must maintain technical standards as per Section 45 of the Telecommunications Act 2001 and relevant QoS policy and regulations as applicable. These standards must include all subscriber based or customer premise equipment (CPE).

8.6 Quality of Service

Cable TV service providers are obliged to provide quality of service (QoS) to subscribers. This includes service obligations mandated by the provider, programming content and service quality offered to the subscriber. The QoS standards and obligations will be prescribed separately under the Quality of Service Policy and regulations.

8.7 Compliance

Compliance procedures for concessionaires, licensees and all existing illegal services providers will be detailed in the Regulations.

8.8 Consumer Protection

Cable TV service providers are required to adhere to consumer protection rights as guided by the Consumer Protection Policy and Regulations.

8.9 Universal Service

In a non-competitive environment, responsibility for universal service expansion falls on the monopoly provider. However, in markets that are moving towards, or in the infancy of competition, the burden of the obligation can be very complex. Competition is likely to benefit all service providers and as such all interconnecting service providers will be required to contribute to the Universal Service Fund on a payment basis to be prescribed by the Authority as detailed in the Policy_on Universal Service.

8.10 Dispute Resolution

A process for resolving disputes shall be detailed in the Regulations and where necessary, further details shall be set forth in the Rules. The process shall be consistent with the provisions of Section 82 of the Telecommunications Act, 2001.

8.11 Interconnection

Interconnection with PSTN and other cable TV networks and services providers will be detailed in the Interconnection Policy and Regulations and the Cable Television Networks and Services Regulations. A major issue for services providers offering voice telephone services is numbering and number portability i.e. enabling subscribers the choice of changing service provider without changing telephone numbers, will be consistent with the National Numbering Plan.

APPENDIX 1

Broadband Access Technologies

Technology	Definition	Bandwidth	Advantages	Disadvantages
ADSL Asymmetric Digital Subscriber Line	Transmission of voice and data over copper	Up to 8 Mbit/s downstream Up to 1.5 Mbit/s upstream	<ul style="list-style-type: none"> ➤ Makes full use of existing copper ➤ Ideal for web browsing ➤ Good platform for voice 	<ul style="list-style-type: none"> ➤ Limited video capability ➤ Distance limitation ➤ Limited upstream bandwidth
VDSL Very High Rate Digital Subscriber Line	Transmission of video, voice and data over copper	Up to 52 Mbit/s downstream Up to 26 Mbit/s symmetrical	<ul style="list-style-type: none"> ➤ Supports broadcast video, video-on-demand, Internet TV and interactive TV ➤ Offers always on network for voice, video and data 	<ul style="list-style-type: none"> ➤ Requires short distance ➤ Non-standard products and technology ➤ Limited
Microwave Multipoint Fixed Services	Microwave transmission of video and data Point-to-point or point-to-multipoint	Up to 1 Gbit/s downstream and upstream	<ul style="list-style-type: none"> ➤ Fast time-to-market ➤ Point-to-multipoint cells have limited geographical area 	<ul style="list-style-type: none"> ➤ Needs line of sight to complete transmission
HFC Hybrid Fibre/Coax	Transmission of video, voice, and data over coaxial and fibre cable	10 to 42 Mbit/s downstream 2 Mbit/s upstream	<ul style="list-style-type: none"> ➤ Supports broadcast video, video-on-demand, Internet TV and interactive TV ➤ Offers always on network for voice, video and data 	<ul style="list-style-type: none"> ➤ Voice requires special engineering ➤ Difficult to guarantee speed ➤ High cost of upgrades and build-outs

(source ITU, Merrill Lynch)

APPENDIX 2

Digital Access Index 2002

Sweden	0.85	Ireland	0.69	Belarus	0.49	Zimbabwe	0.29
Denmark	0.83	Cyprus	0.68	Lebanon	0.48	Honduras	0.29
Iceland	0.82	Estonia	0.67	Thailand	0.48	Syria	0.28
Korea (Rep.)	0.82	Spain	M67	Romania	0.48	Papua New Guinea	0.26
Hammy	0.19	Malta	0.67	Turkey	0.48	Vanuatu	M24
Netherlands	0.79	Czech Republic	0.66	TFYR Macedonia	0.48	Pakistan	0.24
Hong Kong, China	0.79	Greece	0.66	Panama	0.47	Azerbaijan	0.24
Finland	0.79	Portugal	0.65	Venezuela	0.47	S. Tomé & Príncipe	0.23
Taiwan, China	0.79	UAE	0.64	Belize	0.47	Tajikistan	0.21
Canada	0.78	Macao, China	164	St. Vincent	0.46	Equatorial Guinea	0.20
United States	0.78	Hungary	0.63	Bosnia	0.46	Kenya	0.19
United Kingdom	U.//	Bahamas	0.62	Suriname	0.46	Nicaragua	0.19
Switzerland	0.76	Bahrain	0.60	South Africa	0.46	Lesotho	0.19
Singapore	0.75	St. Kitts and Nevis	M60	Colombia	0.45	Nepal	0.19
Japan	0.75	Poland	0.59	Jordan	0.45	Bangladesh	0.18
Luxembourg	0.75	Slovak Republic	0.59	Serbia & Montenegro	0.45	Yemen	0.18
Austria	0.75	Croatia	0.59	Saudi Arabia	0.44	Togo	0.18
Germany	M74	Chile	M55	Peru	M44	Solomon Islands	0.17
Australia	0.74	Antigua & Barbuda	0.57	China	0.43	Cambodia	0.17
Belgium	M74	Barbados	0.57	Fiji	0.43	Uganda	0.17
New Zealand	0.72	Malaysia	0.57	Botswana	0.43	Zambia	0.17
Italy	OJ2	Lithuania	156	Iran (I.R.)	0.43	Myanmar	0.17
France	0.72	Qatar	0.55	Ukraine	0.43	Congo	0.17
Slovenia	OJ2	Brunei Darussalam	0.55	Guyana	0.43	Cameroon	0.16
Israel	0.70	Latvia	154	Philippines	0.43	Ghana	0.16
		Uruguay	M54	Oman	0.43	Lao P.D.R.	M15
		Seychelles	0.54	Maldives	0.43	Malawi	0.15
		Dominica	0.54	Libya	0.42	Tanzania	OAS
		Argentina	0.53	Dominican Rep.	M42	Haiti	OJ5
		Trinidad & Tobago	0.53	Tunisia	0.41	Nigeria	0.15
		Bulgaria	0.53	Ecuador	0.41	Djibouti	OAS
		Jamaica	0.53	Kazakhstan	0.41	Rwanda	0.15
		Costa Rica	0.52	Egypt	0.40	Madagascar	0.15
		St. Lucia	0.52	Cape Verde	0.39	Mauritania	0.14
		Kuwait	0.51	Albania	0.39	Senegal	0.14
		Grenada	0.51	Paraguay	0.39	Gambia	0.13
		Mauritius	0.50	Namibia	0.39	Bhutan	M13
		Russia	0.50	Guatemala	0.38	Sudan	0.13
		Mexico	0.50	El Salvador	0.38	Comoros	0.13
		Brazil	0.50	Palestine	0.38	Moldova	0.13

Sri Lanka	0.38	Eritrea	0.13
Bolivia	0.38	D.R. Congo	0.12
Cuba	0.38	Benin	0.12
Samoa	0.37	Mozambique	M12
Algeria	0.37	Angola	0.11
Turkmenistan	0.37	Burundi	0.10
Georgia	0.37	Guinea	0.10
Swaziland	0.37	Sierra Leone	0.10
Moldova	0.37	Central Af. Rep.	0.10
Mongolia	0.35	Ethiopia	0.10
Indonesia	0.34	Guinea-Bissau	Mu
Gabon	0.34	Chad	0.10
Morocco	M33	Mali	M09
India	0.32	Burkina Faso	0.08
Kyrgyzstan	0.32	Niger	0.04
Uzbekistan	0.31		
Viet Nam	0.31		
Armenia	0.30		

Note: On a scale of 0 to 1 where 1 - highest access. DAI values are shown to hundreds of a decimal point: Countries with the same DAI value are ranked by thousands of a decimal point.

Source: U - - - - -

APPENDIX 3

Comparison of Various Communication Technologies

Technology	Speed	Physical Medium	Application
High-Speed Circuit-Switched Data service (HSCSD)	Up to 56 Kbps	RF in space (wireless)	Mobile telephone for business and personal use
Regular telephone service (POTS)	Up to 56 Kbps	Twisted pair	Home and small business access
Dedicated 56Kbps on frame relay	56 Kbps	Various	Business e-mail with fairly large file attachments
DSO	4 Kbps		the base signal on a channel in the set of Digital Signal levels
General Packet Radio System (GPRS)	156 to 114 Kbps	RF in space (wireless)	Mobile telephone for business and personal use
ISDN	BRI: 64 Kbps to 128 Kbps PRI: 23 (T-1) or 30 (E1) assignable 64-Kbps channels plus control channel; up to 1.544 Mbps (T-1) or 2.048 (E1)	BRI: Twisted-pair PRI: T-1 or E1 line	BRI: Faster home and small business access PRI: Medium and large enterprise access
Enhanced Data GSM Environment (EDGE)	384 Kbps	RF in space (wireless)	Mobile telephone for business and personal use
Satellite	00 Kbps (DirecPC and others)	RF in space (wireless)	Faster home and small enterprise access
DS1/T-1	1.544 Mbps	Twisted-pair, coaxial cable, or optical fiber	Large company to ISP ISP to Internet infrastructure
Universal Mobile Telecommunications Service (UMTS)	Up to 2 Mbps	RF in space (wireless)	Mobile telephone for business and personal use (available in 002 or later)
E-carrier	048 Mbps	Twisted-pair, coaxial cable, or optical fiber	32-channel European equivalent of T-1
Digital Subscriber Line (DSL)	512 Kbps to 8 Mbps	Twisted-pair (used as a digital, broadband medium)	Home, small business, and enterprise access using existing copper lines
Cable modem	512 Kbps to 52 Mbps	Coaxial cable (usually used for downstream); in some systems, used for upstream	Home, business, school access
Ethernet	10 Mbps	10BASE-T (twisted-pair); 10BASE-2 or -5 (coaxial cable) ; 10BASE-F (optical fiber)	Most popular business local area network (LAN)
OC-1	51.84 Mbps	Optical fiber	ISP to Internet infrastructure Smaller links within Internet infrastructure
Fast Ethernet	100 Mbps	100BASE-T (twisted pair); 100BASE-T (twisted pair); 10013ASE-T (optical fiber)	Workstations with 10 Mbps Ethernet cards can plug into a Fast Ethernet LAN
Fiber Distributed-Data Interface (FDDI)	100 Mbps	Optical fiber	Large, wide-range LAN usually in large company or a larger ISP
Gigabit Ethernet	1 Gbps	Optical fiber (and "copper up to 100 meters)	Workstations/networks with 10/100 Mbps Ethernet plug into Gigabit Ethernet switches

APPENDIX 4

Rules and Regulatory Oversight in Different Countries

Country	Law Regulation Cable	Telecommunications Companies providing Cable	Cable companies providing telephone services
Brazil	Yes	Yes	No
Canada	Yes	Yes	Yes
Chile	Yes	Yes	Yes
Argentina	No	No	No
Colombia	Yes	Yes	Yes
Dominican Rep.	Yes	Yes	Yes
Mexico	Yes	Yes	Yes
USA	Yes	Yes	Yes
Venezuela	Yes	Yes	Yes
Suriname	No	Yes	No
St. Lucia	No	Yes	No
Australia	Yes	Yes	Yes
Japan	Yes	Yes	Yes
China	Yes	No	No
Singapore	Yes	Yes	Yes
Most European Countries	Yes	Yes	Yes

Source: ITU, World Telecommunication Regulatory Database, 2002

DEFINITIONS

Broadband

Recommendation I.113 of the ITU Standardization Sector (ITU-T) defines broadband as a transmission capacity that is faster than primary rate ISDN at 1.5 or 2.0 Mbit/s. The Organization for Economic Co-operation and Development (OECD) considers broadband to correspond to transmission speeds equal to or greater than 256 kbit/s.

Leased Line

Also referred to as a private line. A leased line is obtained from a communications company (carrier) to provide a transmission medium between two points. The line consists of a permanent dedicated circuit between two points, or to set of previously arranged points. The cost of the line is usually based on the distance between locations. This is in contrast to switched or dial-up lines, which can be connected to any point on the network.

Digital divide

The gap between those who have computers with Internet access and those who do not, as well as the gap between those who are computer literate and those who are not

Coaxial Cable

Data transmission medium with a single-wire conductor insulated from electro-magnetic and radio frequency interference.

Cable Modem

A technology that allows high-speed interactive services, including Internet access, to be delivered over a cable TV network.

Full Duplex

The ability to send and receive data at the same time.

Half Duplex

The ability to send data in only one direction at a time.

Headend

The control center of a cable television system, where broadcast signals are received and distributed.

DOCKS

Data over cable systems interface specifications (ITU-T J.122) - An ITU Recommendation for cable modems. It specifies modulation schemes and the protocol for exchanging bi-directional signals over cable.

PTO

Public Telecommunications Operator. - A provider of telecommunications infrastructure and services to the general public ("public" refers to the customer base). Also referred to as an operator, service provider, carrier or "telco".

USO

Universal Service Obligations. - Requirements that governments place on operators to offer service in all areas, regardless of economic feasibility.

POTS

Plain Old Telephone System - refers to the standard telephone service that most homes use. Telephone services based on high-speed, digital communications lines, such as ISDN, xDSL and FDDI, are not POTS. The main distinctions between POTS and non-POTS services are speed and bandwidth where POTS are generally restricted to about 52Kbps. The POTS network is also known as the public switched telephone network (PSTN).

VSAT

Very Small Aperture - An earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television. A VSAT consists of two parts, a transceiver that is placed outdoors in direct line of sight to the satellite and a device that is placed indoors to interface the transceiver with the end user's communications device.

MMDS

Multi-channel Multipoint Distribution Service - is a broadband wireless point-to-multipoint technology utilizing UHF frequencies typically 2.1GHz — 2.9GHz range providing coverage up to distance of 70 miles. It can deliver data and telephony bringing high-bandwidth services to homes and offices.

LMDS

Local Multipoint Distribution Service - a fixed wireless technology that typically operates in the 27GHz – 31GHz band and offers line-of-sight coverage over distances up to 3-5 kilometers. It can deliver data and telephony bringing high-bandwidth services to homes and offices within the "last mile" of connectivity, an area where cable or optical fiber may not be convenient or economical. Data transfer rates for LMDS can reach 1.5 Gbps to 2 Gbps.