



Spectrum Plan for Accommodation of Public Mobile Telecommunications Services

Maintenance History		
Date	Change Details	Version
01-08-04	Approved Version	1.0
30-09-08	Revised Version – Plan updated: <ul style="list-style-type: none"> • Based on conclusion of the competitive licensing process for the introduction of new public mobile telecommunications service concessionaires, which concluded in June 2005. 	2.0

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1 Objectives

- 1.1 This document discusses the factors considered for the development of a spectrum band plan to accommodate the provision of public mobile telecommunications services in Trinidad & Tobago, and defines the spectrum bands to be allocated for such systems.
- 1.2 The purpose of this document is to provide guidelines for operators seeking to provide mobile telecommunications services about the spectrum bands to be used exclusively for mobile services, and consequently, the remaining spectrum that can be used for deployment of other systems and applications.
- 1.3 This plan focuses upon the spectrum to be used for provision of mobile telecommunications services, and the justification of the spectrum identified. This document does not speak of licensing terms and conditions, competition policies, and other regulatory matters associated with competitive mobile services, nor of the selection and licensing framework to be used to assign the spectrum, which will be covered in separate and related documents.

2 Review Cycle

This document will be modified periodically to meet changing and unforeseen circumstances. The Authority will review and modify this spectrum plan as necessary and in consultation with stakeholders to ensure that the plan is guided by appropriate policy guidelines and objectives.

Questions or concerns regarding the maintenance of this spectrum plan may be directed to the Authority.

3 The Current Environment

- 3.1 The incumbent operator, Telecommunications Services of Trinidad & Tobago (TSTT), presently has assignments in the 800 MHz and the 1800 MHz band, in which they operate a Global System for Mobile (GSM) public mobile telecommunications network. CDMA 2000 EVDO is also employed by TSTT using spectrum in the 800 MHz band for its mobile Internet service offerings. TSTT is in the process of migrating from the 1800 MHz band to the 1900 MHz band, in accordance with the Migration Plan: 1800 MHz Band to 1900 MHz Band Allocated to Cellular Mobile Services for TSTT.
- 3.2 Presently in the 800 MHz band, TSTT operates in 2 x 12.5 MHz of spectrum available for cellular services, and in the 1800MHz band. However, 2 x 7.5 MHz of spectrum in the 800MHz band will become available by December 31st 2011, as the licence term of this spectrum will end. This reclamation of spectrum will result in all cellular mobile operators in this band having a maximum of 2 x 5 MHz plus a quantum for guard bands (not to exceed 2 x 2.5 MHz).
- 2.1 The Telecommunications Authority of Trinidad and Tobago (hereafter called “the Authority”) conducted an authorisation process (from September 2004 to June 2005) to introduce two (2) new entrants in the public mobile telecommunications market. Out of this process, Digicel (Trinidad and Tobago) Limited and LaqTel Limited were authorized to provide public mobile telecommunications services, in addition to the incumbent. Unfortunately, the spectrum that was licensed to LaqTel Limited was reclaimed and its concession revoked as it was not able to launch service in the allotted timeframe. This reclaimed spectrum is now available for a new entrant, via an authorisation process determined by the Authority. Digicel continues to compete against TSTT in this marketplace to-date.

4 Relevant Considerations

- 4.1 The International Telecommunications Union (ITU) has broadly identified the spectrum bands 806 – 960MHz and 1710 – 2200MHz for provision of mobile telecommunications services, traditionally offering voice, but recently providing data services as well.
- 4.2 Generally, there exists two predominant spectrum plans globally; that of North America and that of the European Union. Administrations worldwide develop spectrum plans that either adhere completely with one of these spectrum plans, or use a blend of both designations for accommodations of mobile services within their jurisdiction due to availability of the relevant systems. North America has operated mobile telecommunications systems in the 800MHz (824 – 849/869 – 894MHz) and 1900MHz (1850 – 1910/1930 – 1990MHz) spectrum bands, whereas their counterpart systems in Europe operate in the 900MHz (880 – 915/925 – 960MHz) and 1800MHz (1710 – 1785/1805 – 1880MHz) bands.
- 4.3 The blend of spectrum plans and consequently, systems from Europe and North America presents its own challenges, due to the inability of radio equipment designed for one market to coexist in the same environment as those designed for another market, causing potential quality degradation and interference occurrence. A blend of spectrum plans requires extraordinary steps to engineer adjacent systems generally resulting in inefficient use of spectrum, supporting the position to adopt a spectrum plan that conforms to only one of the available plans.
- 4.4 Trinidad & Tobago belongs to ITU Region 2, and imports a significant portion of equipment from North America. It is advisable that Trinidad & Tobago adopts spectrum band plans that conform to North American markets to ensure equipment availability, and in particular handset availability. Additional factors requiring consideration include compatibility of international and regional crossborder systems such as mobile-satellite communications systems and

coexistence with widely available radiocommunications systems, such as Industrial, Scientific and Medical (ISM) applications, which operate in the band 902 – 928MHz.

- 4.5 The largest proportion of international travelers entering Trinidad & Tobago in 2003 has come from North America (45%) as compared with travelers from Europe and Africa (19%), as shown in Appendix I. Furthermore, travelers from the eastern hemisphere of the globe venturing to this hemisphere typically equip themselves with appropriate handsets that allow roaming into North American markets, further suggesting the adoption of a plan that conforms with North America, and the majority of Latin America.
- 4.6 Various systems exist in the 900 MHz band that are used to license Region 1 cellular mobile networks. These include Studio to Transmitter Auxiliary Links for Broadcasting Services, paging systems, low powered telemetering systems and the Industrial, Scientific and Medical (ISM) applications and systems. In Trinidad and Tobago, making spectrum available in this band will be difficult due to the operation of numerous of these radiocommunications systems in the 900 MHz band.
- 4.7 The predominant second generation mobile telecommunications technologies are Code Division Multiple Access (CDMA), Global System for Mobile (GSM) Communications and its variants such as Enhanced Data rates for GSM Evolution (EDGE). Third generation systems have generally been based upon Wideband CDMA. All of these technologies are available at this time within the North American spectrum allocations, while a European spectrum allocation will eliminate the accommodation of second generation CDMA deployments.
- 4.8 The Authority recognizes that spectrum has been made available for public mobile telecommunications services in other frequency bands, namely for 3G mobile networks. However, this Plan will be revised to include consideration of

spectrum allocation to 3G and beyond mobile networks at a later date, to be determined by the Authority.

5 Practice in the Caribbean

- 5.1 A review of spectrum allocation and assignments in the Caribbean was performed to determine the patterns emerging among Caribbean countries. Some Caribbean countries have adopted a blend of the Region 1 and Region 2 mobile services allocations, while others have ensured that they have remained compliant to one particular regional spectrum plan. This review is summarized in Appendix II.

6 The Trinidad & Tobago Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services

- 6.1 The Authority has already assigned spectrum in the 800 MHz and 1900 MHz bands to the existing operators that provide public mobile telecommunications services in Trinidad and Tobago.
- 6.2 The Authority will make available the following spectrum to a new entrant wishing to provide public mobile telecommunications services (see Table 1). The spectrum in the 1900MHz band will be assigned based on the North American Personal Communications Services (PCS) block designation. In the 800MHz band, the spectrum has been divided into blocks as shown. Guard bands for Operators authorized to use adjacent blocks of frequencies will be determined at such time when the concessionaires, and accordingly the respective technologies to be used, have been determined.

Table 1: Frequency Assignment Plan for the Provision of Public Mobile Telecommunications Services to New Entrant

Band	Spectrum/MHz		
800MHz	824 – 825	869 – 870	A'
	825 – 830	870 – 875	A ₁
1900 MHz	1880 – 1885	1960 – 1965	B3
	1885 – 1890	1965 – 1970	E

6.3 The spectrum listed in Table 2 will be available from January 1st 2011, as it is presently reserved for an incumbent operator to migrate from the 1800 MHz band to the 1900 MHz band:

Table 2: Frequency Assignment Plan for the Provision of Public Mobile Telecommunications Services to New Entrant from January 1st, 2011

Band	Spectrum/MHz		
1900 MHz	1870 – 1875	1950 – 1955	B1
	1875 – 1880	1955 – 1960	B2

6.4 The spectrum in Table 3 has been assigned to the two (2) existing operators for accommodation of their existing systems.

Table 3: Frequency Assignment Plan for the Provision of Public Mobile Telecommunications Services to Existing Operators

Band	Spectrum/MHz		
800MHz	830 – 835	875 – 880	A _u
	845 – 846.5	890 – 891.5	A''
	835 – 845	880 – 890	B
	846.5 – 849	891.5 – 894	B'
1800 MHz	1740 – 1760	1835 – 1855	
1900 MHz	1890 – 1895	1970 – 1975	F
	1895 – 1910	1975 – 1990	C

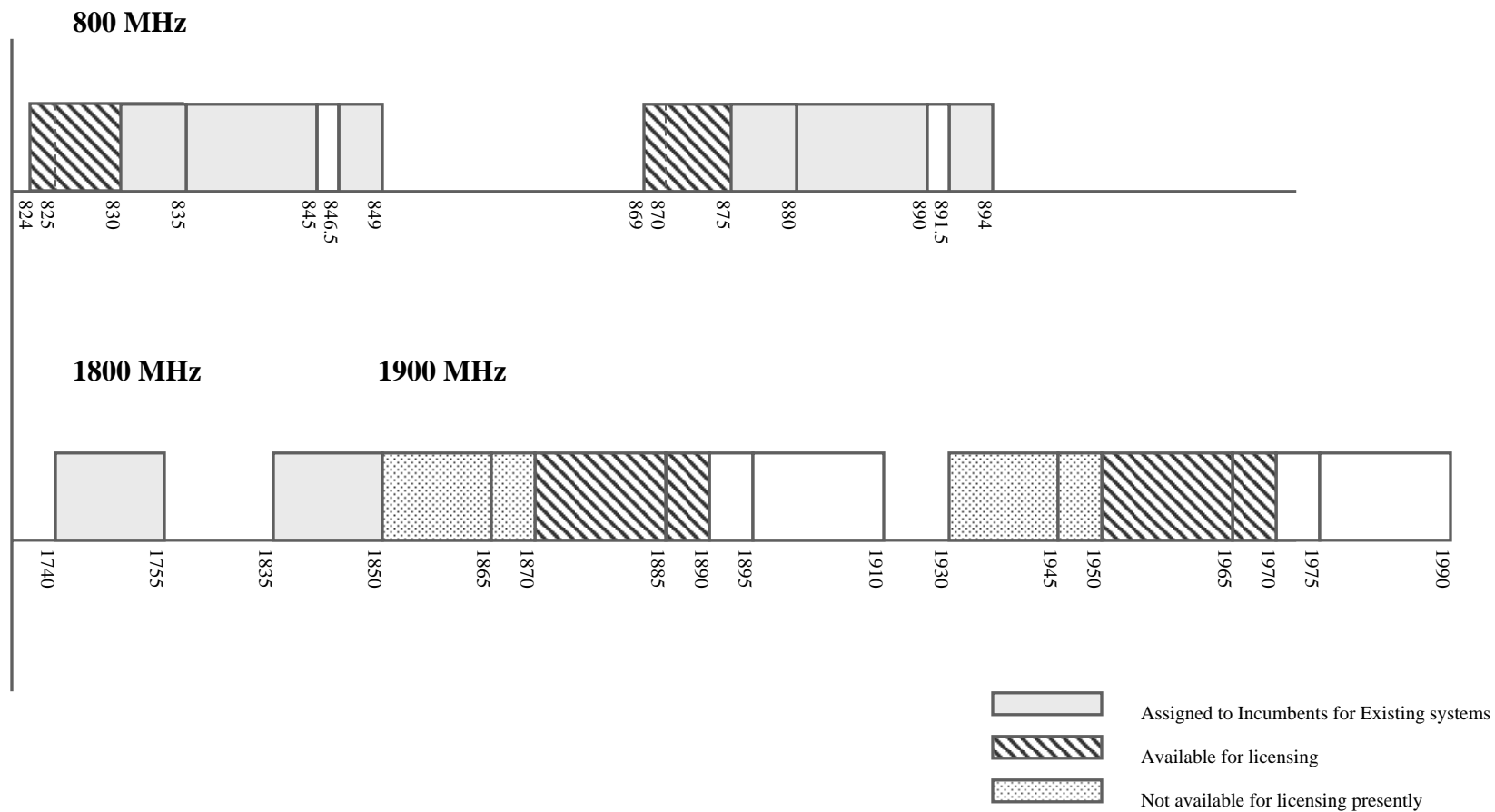
6.4 To accommodate TSTT migrating to the 1900 MHz band, in conformance with ITU Region 2 administrations, the following spectrum will not be available for licensing at this time. As TSTT requests spectrum in this band, spectrum assigned in the 1800MHz band will be revoked accordingly. Spectrum in this band will be assigned initially in the PCS A block. Spectrum not used by TSTT by January 2012 may become available for licensing to new or existing operators at that time.

Table 3: Frequency Assignment Plan Reserved for Assignment to TSTT in 1800 MHz Band when it Migrates to the 1900 MHz Band

Band	Spectrum/MHz		
1900MHz	1850 – 1865	1930 – 1945	A
	1865 – 1870	1945 – 1950	D

6.5 Figure 1 illustrates the Frequency Assignment Plan for the Accommodation of Public Mobile Telecommunications Services.

Figure 1 – Public Mobile Telecommunications Services Frequency Assignment Plan



7 Auxiliary Spectrum for Core and Inter-Cell Site Transmission Networks

- 7.1 The following spectrum bands will be used initially for accommodation of auxiliary systems for providing public mobile telecommunications networks, such as core and inter-cell site transmission networks (i.e. point-to-point microwave links):

Table 4: Frequency Bands Available for Mobile Auxiliary Systems (e.g. Core and Inter-Cell Site Transmission Network)

Frequency Band	Frequency Range / GHz
6 GHz	5.850 – 6.425
7 GHz	7.125 – 7.425
11 GHz	10.7 – 11.7
13 GHz	12.75 – 13.25
15 GHz	14.5 – 15.35

- 7.2 The Operator will be required to apply separately for any auxiliary spectrum. And the core or inter-cell site microwave links shall be licensed prior to installation and operation.
- 7.3 Please note that there are existing licensees operating in these frequency ranges and some frequencies are assigned more than once (re-used). Therefore, the assignment of frequencies to the applicant shall only be where technically feasible. Additionally, the applicant has the option of an exclusive licensing (i.e. a spectrum licence) for frequencies that are currently not assigned to any existing licensee, based on the number of times that the applicant re-uses these frequencies.

Appendix I - Nationality of arrived visitors to Trinidad & Tobago

2002			2003 (Jan to Sep' 03)		
Country			Country		
	Total	% of total		Total	% of total
Total	384,212		Total	303,841	
Europe	71,133	18.51%	Europe	58,210	19.16%
Central/Eastern Europe	326		Central/Eastern Europe	254	
Northern Europe	56,115	14.61%	Northern Europe	45,391	14.94%
Southern Europe	1,977		Southern Europe	1,379	
Western Europe	12,504		Western Europe	11,039	
East/Med Europe	211		East/Med Europe	147	
Africa	997	0.26%	Africa	740	0.24%
Eastern Africa	178		Eastern Africa	102	
Middle Africa	27		Middle Africa	33	
Northern Africa	26		Northern Africa	12	
Southern Africa	386		Southern Africa	288	
Western Africa	380		Western Africa	305	
Americas	308,018	80.17%	Americas	241,141	79.36%
Caricom	81,278	21.16%	Caricom	64,878	21.38%
Other Caribbean	10,514		Other Caribbean	8,243	
Central America	1,433		Central America	1,191	
Caricom	280		Caricom	286	
Other Central America	1,153		Other Central America	905	
Northern America	175,873	48.77%	Northern America	136,979	48.08%
South America	38,920		South America	29,850	
Caricom	24,643		Caricom	19,304	
Other Southern America	14,277		Other Southern America	10,546	
Asia/Pacific	3,834	1.00%	Asia/Pacific	3,542	1.17%
Northeastern Asia	1,123		Northeastern Asia	925	
Southeastern Asia	496		Southeastern Asia	316	
Southern Asia	1,164		Southern Asia	847	
Australasia	1,005		Australasia	1,423	
Melanesia	16		Melanesia	11	
Micronesia	26		Micronesia	18	
Polynesia	4		Polynesia	2	
Middle East	219	0.06%	Middle East	175	0.06%
Middle East	219		Middle East	175	
Not Stated	11	0.00%	Not Stated	33	0.01%

Source: Central Statistical Office

Appendix II – Mobile Technologies used in the Caribbean and environs

		Region 2			Region 2			Region 1	
		TDMA800	CDMA 800	GSM 850	TDMA1900	CDMA1900	GSM1900	GSM 900	GSM 1800
Anguilla	Region 2	✓							
Antigua	Region 2	✓					✓		
Aruba	Region 1, 2	✓					✓	✓	✓
Barbados	Region 1, 2	✓					✓	✓	✓
British Virgin Isles	Region 2	✓			✓				
Cayman Isles	Region 2	✓		✓		✓			
Costa Rica	Region 1, 2	✓							✓
Cuba	Region 1, 2	✓					✓		
Dominica	Region 2	✓							
Grenada	Region 1, 2	✓		✓			✓	✓	
Guyana	Region 2	✓							
Haiti	Region 2	✓	✓						
Jamaica	Region 1, 2	✓	✓				✓	✓	✓
Martinique	Region 1						✓	✓	
Netherlands Antilles	Region 1, 2	✓					✓		
Puerto Rico	Region 2	✓	✓			✓			
St. Kitts & Nevis	Region 2	✓		✓			✓		
St. Lucia	Region 1, 2	✓					✓	✓	
St. Vincent & the Grenadines	Region 1, 2	✓					✓	✓	
US Virgin Isles	Region 2	✓				✓			
Venezuela	Region 1, 2	✓					✓		