Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services

(Version 5.0)

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Maintenance History		
Date	**Change Details**	**Version**
1st August 2004	Approved version	1.0
30th September 2008	Final approved version – Plan updated based on the conclusion of the competitive licensing process for the introduction of new public mobile telecommunications service concessionaires, which concluded in June 2005	2.0
26th June 2013	Final approved version – Plan updated following consultation, to include 700 MHz spectrum for the provision of public mobile telecommunications services	3.0
15th November 2017	Final approved version – Plan updated based on consultation, to include AWS Band and to change from the US 700 MHz band plan to the APT 700 MHz band plan for the provision of public mobile telecommunications services	4.0
1st March 2023	Consultative document including the shift in the PPDR allocation in the 700 MHz band; the amendment of the frequency assignment plan for the 850 MHz band; the expansion of the 1900 MHz and 1.7/2.1 GHz bands; the inclusion of 2.5 and lower 3.5 GHz bands for cellular mobile radiocommunications service; and revisions to the existing spectrum caps	4.1
30th January 2024	Consultative document including revisions to the spectrum caps to allow existing operators to maximise the available spectrum in selected bands, and minor amendments to improve clarity	4.2
2nd August 2024	Approved version	5.0

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Abbreviations

2G	second generation
3G	third generation
3GPP	3rd Generation Partnership Project
4G	fourth generation
5G	fifth generation
APT	Asia-Pacific Telecommunity
AWS	advanced wireless services
BPSK	binary phase-shift keying
BWA	broadband wireless access
CDMA	Code Division Multiple Access
CEPT	European Conference of Postal and Telecommunications Administrations
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
FDD	frequency division duplexing
GHz	gigahertz
GSM	Global System for Mobile communications
HSPA	High Speed Packet Access
HSPA+	Evolved High Speed Packet Access
ICT	information and communications technology
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union Radiocommunications
kHz	kilohertz
LTE	Long-Term Evolution
LTE-A	LTE Advanced
MHz	megahertz
NSP	National Spectrum Plan
PCS	personal communications services
PMTS	public mobile telecommunications services
PPDR	public protection and disaster relief
QPSK	quadrature-phase shift keying
TATT	Telecommunications Authority of Trinidad and Tobago
TDD	time division duplexing
UMTS	Universal Mobile Telecommunications System
WCDMA	Wideband Code Division Multiple Access
WRC-07	World Radiocommunication Conference 2007
WRC-15	World Radiocommunication Conference 2015

1 Introduction

1.1 Background

The Telecommunications Authority of Trinidad and Tobago (the Authority) is mandated by the Telecommunications Act, Chap. 47:31 (the Act), under section 41(1) to:

> regulate the use of the spectrum in order to promote the economic and orderly utilisation of frequencies for the operation of all means of telecommunications and to recover the cost incurred in the management of the spectrum.

To facilitate the introduction of additional cellular mobile operators, the Authority, in 2004, allocated spectrum in the 850 MHz and 1900 MHz bands, based on prevailing cellular mobile technologies. Concessions were consequently granted by the Minister to two operators to provide public telecommunications services and operate public domestic mobile telecommunications networks, and the incumbent and new entrants were assigned spectrum in these bands.

Pursuant to the Authority's commitment to consider additional bands for International Mobile Telecommunications (IMT), in 2017, the Authority revised its *Spectrum Plan for Public Mobile Telecommunications Services* (June 2013) to include the advanced wireless services (AWS) band comprising 1.7/2.1 GHz spectrum and the 700 MHz band, adopting the Asia-Pacific Telecommunity (APT) channel plan. In April 2019 and June 2020, the Authority invited the existing cellular mobile operators to apply for 1.7/2.1 GHz and 700 MHz spectrum, which resulted in assignments in both bands.

The cellular mobile sector currently comprises two operators – Digicel (Trinidad & Tobago) Limited and Telecommunications Services of Trinidad and Tobago Limited (TSTT). These operators have deployed Global System for Mobile communications (GSM) and its enhancements, Wideband Code Division Multiple Access (WCDMA) with Evolved High-Speed Packet Access (HSPA+) and Long-Term Evolution (LTE) technologies within the spectrum assigned.

In keeping with the principles of the *Spectrum Management Framework* (October 2022) to allocate spectrum to the highest value use and to enable and encourage spectrum to move to its highest value use, the Authority will make additional low- and mid-band spectrum available for public mobile telecommunications services (PMTS) under this revised *Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services* (the Plan).

1.2 Purpose

The purpose of this Plan is to prescribe the frequency bands, channel assignment plans, spectrum caps for individual and aggregate bands, and associated conditions for the provision of public mobile telecommunications services that will be adopted for assignment by the Authority to ensure adequate spectrum is available, on a reasonably equitable basis, to promote quality mobile services.

1.3 Objectives

The Plan:

1. reviews and considers the global environment, including market and sector interests.

2. identifies the frequency ranges, assignment plans and spectrum caps that will be allocated for the provision of public mobile telecommunications services.

3. outlines the licensing process for the assignment of frequency ranges, including any specific licensing conditions.

4. defines the technical operating conditions and specifications to be imposed on the licensed radiocommunications systems in the allocated frequency ranges.

1.4 Scope

The Plan is a subset of the *National Spectrum Plan* (NSP), which serves as the instrument for regulating the use of spectrum, in an orderly, efficient manner, in accordance with the Authority's mandate under the Act. As a plan, it specifies how suitable spectrum will be allocated for public mobile telecommunications services under existing legislation and procedures.

This Plan specifies the spectrum bands that have been allocated by the Authority for the provision of public cellular mobile telecommunications services, the allotment of channels within those bands and how they will be licensed to the respective concessionaires. The bands contained in this Plan can accommodate the deployment of second, third, fourth and fifth generation technologies for mobile services. The Plan does not address the allocation and licensing of spectrum bands for satellite broadband services or broadband wireless access, including fixed wireless access and private mobile networks.

1.5 Relevant Legislation

The following sections of the Act inform this Plan:

Section (18) (1) (i):

> Subject to the provisions of this Act, the Authority may exercise such functions and powers as are imposed on it by this Act and in particular –
> Plan, supervise, regulate and manage the use of the radio frequency spectrum, including –
>
> 1. the licensing and registration of radio frequencies and call signs to be used by all stations operating in Trinidad and Tobago or on any ship, aircraft, or other vessel or satellite registered in Trinidad and Tobago;
>
> 2. the allocation, assignment and reallocation or reassignment of frequency bands where necessary.

Section 21 (1):

> No person shall operate a public telecommunications network, provide a public telecommunications service or broadcasting service, without a concession granted by the Minister.

Section 36 (1):

> No person shall –
> 1. establish, operate or use a radio-communication service;
> 2. install, operate or use any radio transmitting equipment; or
> 3. establish, operate or use any radio-communication service on board any ship, aircraft, or other vessels in the territorial waters or territorial airspace of Trinidad and Tobago, other than a ship of war or a military aircraft or satellite registered in Trinidad and Tobago without a licence granted by the Authority.

Section 41 (1):

> The Authority shall regulate the use of the spectrum in order to promote the economic and orderly utilisation of frequencies for the operation of all means of telecommunications and to recover the cost incurred in the management of the spectrum.

Section 41 (2):

> The Authority shall develop a spectrum plan in order to regulate the use of the spectrum.

Section 41 (3):

> The National Spectrum Plan shall be made available to the public in the manner prescribed by the Authority.

Section 41 (4):

> The National Spectrum Plan shall state how the spectrum shall be used and the procedures for licensing frequency bands.

1.6 Other Relevant Documents

Other relevant policies, plans and regulations, currently in effect, to be read along with this Plan include:

1. *Authorisation Framework for the Telecommunications and Broadcasting Sectors of Trinidad and Tobago* (TATT, 2005)

2. *Spectrum Management Framework* (TATT, 2022)

3. *National Spectrum Plan* (TATT, 2008)

4. *Trinidad and Tobago Frequency Allocation Table* (8.3 kHz–3000 GHz) (TATT, 2019)

5. *Spectrum Plan for the Accommodation of Broadband Wireless Access Services* (TATT, 2008)

6. *Framework for Fifth Generation (5G) Public Mobile Telecommunications Networks* (TATT, 2023)

These documents can be found on the Authority's website, www.tatt.org.tt

1.7 Review Cycle

This Plan will normally be reviewed every four years to meet changing needs, taking into account technological advancements and regional allocations, but it may be reviewed at any time at the discretion of the Authority, or based on proposals for immediate modification submitted by stakeholders or members of the public. The Authority will review the document and, if necessary, make modifications, in consultation with stakeholders, to ensure the Plan is guided by appropriate policy guidelines and objectives.

Questions or concerns regarding the maintenance of the Plan may be directed to the Authority via email at consultation@tatt.org.tt.

1.8 Consultation Process

In accordance with its *Procedures for Consultation in the Telecommunications and Broadcasting Sectors of Trinidad and Tobago* (TATT 2021), the Authority sought the views of stakeholders and the public on this Plan.

On 1st March 2023, the Plan was released for the first of two rounds of public consultation for a period of four weeks, ending 31st March 2023. The consultation period was extended for a further two weeks, ending 14th April 2023.

The following modifications were made to the Plan based on the comments received:

1. Subsection 2.2 was amended to include an additional national consideration.
2. The spectrum caps were increased in all of the bands.
3. Other minor modifications were made to improve clarity.

On 30th January 2024, the Plan was released for the second of two rounds of public consultation for a period of five weeks. Comments and recommendations from that consultation were taken into consideration in finalising version 5.0 of the Plan.

The following modifications were made to the Plan based on the comments received:

1. Subsections 4.1.3 and 4.2.3 were amended to revise the spectrum cap for the 700 MHz and 850 MHz bands and reduce the aggregate spectrum cap for the 700 MHz and 850 MHz bands.

2. Subsections 4.3.3 and 4.4.3 were amended to extend the spectrum cap for the 1900 MHz and AWS bands to 80 MHz (i.e., 2 x 40 MHz).

The spectrum caps – band and aggregate – ensure spectrum is available to be assigned to three mobile operators.

1.9 Definitions

Equivalent isotropically radiated power (EIRP): the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain) (ITU-R 2020)

Effective radiated power (ERP) (in a given direction): the product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction (ITU-R 2020)

Harmful interference: interference that endangers the functioning of telecommunications so as to impede, degrade, obstruct or interrupt a telecommunications service (the Act)

Primary service: a radiocommunications service for which stations can claim protection from harmful interference from stations of a secondary service (ITU-R 2020)

Public telecommunications network: a telecommunications network used to provide a public telecommunications service (the Act)

Public telecommunications service: a telecommunications service, including a public telephone service, offered to members of the general public, whereby one user can communicate with any other user in real time, regardless of the technology used to provide such service (the Act)

Secondary service: a radiocommunications service for which stations shall not cause harmful interference to stations of primary services and cannot claim protection from interference from stations of primary services (ITU-R 2020)

Station: one or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunications service or radio astronomy service (ITU-R 2020)

2 Considerations for the Accommodation of Public Mobile Telecommunications Services

2.1 The Global Environment

Cellular mobile technologies continue to evolve, with new generations being released approximately every decade. Fifth generation (5G) technology is the latest cellular mobile platform available. Since the first commercial deployment of 5G in April 2019, globally, 200 cellular operators in more than 80 markets now offer 5G services (ITU 2022). Fourth generation (4G) cellular mobile technology is also still widely deployed. In markets where 4G networks are deployed, 4G technologies typically operate in parallel with earlier generation technologies – in many cases, with both second generation (2G) and third generation (3G). International Mobile Telecommunications (IMT) refers to the entire family of technology specifications for mobile broadband systems. “IMT-2000” refers to the family of 3G; “IMT-advanced” refers to 4G; and “IMT-2020” refers to 5G technology specifications.

This technological revolution is accompanied by a corresponding evolution in spectrum use. Planning must, therefore, consider spectrum allocation for all generations of technologies in deployment. The International Telecommunications Union (ITU) has identified spectrum for IMT for the provision of public mobile telecommunications networks and services. Table 1 lists the various frequency bands identified for IMT. These bands are allocated to the mobile services in Article 5 of the ITU Radiocommunication (ITU-R) Radio Regulations, and footnotes are used to identify the bands for IMT. For example, footnote 5.384A identifies several bands for IMT:

> *The frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz, or portions thereof, are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution 223 (Rev.WRC-15). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations*.

Table 1. Frequency bands identified for IMT

Spectrum Category	Band (MHz)	Footnotes Identifying the Band for IMT (ITU-R Region 2 and Global Footnotes are in bold)
Low-band[1]	450–470	**5.286AA**
	470–698	**5.295**, 5.296A, **5.308A**
	698–960	5.313A, **5.317A**
Mid-band[2]	1427–1518	5.341A, **5.341B**, 5.341C, 5.346, 5.346A
	1710–2025	**5.384A**, **5.388**
	2110–2200	**5.388**
	2300–2400	**5.384A**
	2500–2690	**5.384A**
	3300–3400	5.429B, **5.429D**, 5.429F
	3400–3600	5.430A, **5.431B**, 5.432A, 5.432B, 5.433A
	3600–3700	**5.434**
	4800–4990	**5.441A**, 5.441B
High-band[3]	24250–27500	**5.532AB**
	37000–43500	**5.550B**
	45500–47000	5.553A
	47200–48200	**5.553B**
	66000–71000	**5.559AA**

Source: ITU-R Radio Regulations Resolutions and Recommendations, Edition of 2020

At ITU, work has begun on developing the next IMT standard – IMT systems for 2030 and beyond – which will be known as sixth generation (6G). ITU-R Study Group 5 Working Party 5D (Terrestrial Services) is preparing a "vision" recommendation for the next generation of mobile technologies for 2030 and beyond (ITU 2022). This recommendation was completed within the 2019–2023[4] study cycle (ITU 2022).

Figure 1 illustrates the low- and mid-band spectrum bands that are used for cellular mobile services globally.

[1] Low-band spectrum refers to frequency bands below 1 GHz.

[2] Mid-band spectrum refers frequency bands in the 1–7 GHz range.

[3] High-band or mmWave spectrum refers to the 26 GHz, 28 GHz, 40 GHz and 66–71 GHz frequency bands.

[4] ITU-R REC M.2160 Framework and overall objectives of the future development of IMT for 2030 and beyond

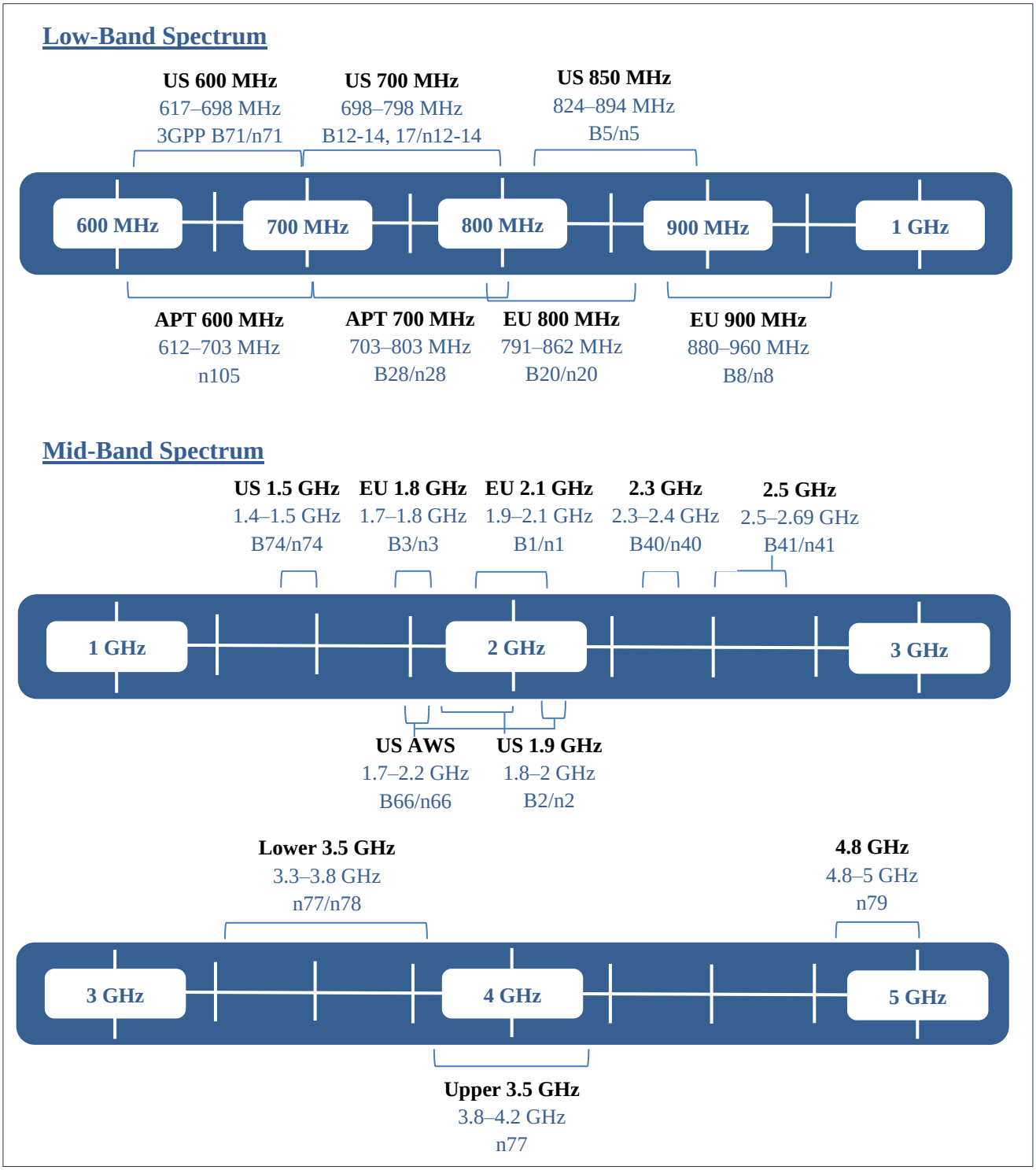

Figure 1. Cellular mobile frequency bands (low- and mid-band spectrum)

2.2 National Considerations

The adoption of 5G can be accelerated within the spectrum currently used for 4G. The expectation is that the 700 MHz, 850 MHz, 1900 MHz and 1.7/2.1 GHz bands could be used to accommodate both existing and 5G technology. The channel plans and spectrum caps of these frequency bands were therefore optimised to accommodate both. Spectrum caps across multiple bands were also adopted to enable larger spectrum assignments within bands to facilitate 5G deployments, and simultaneously freeing spectrum in nearby bands with similar propagation characteristics. Additionally, mid-band spectrum in the 2.5 GHz and 3.5 GHz bands were included, as these bands offer a unique mixture of coverage and capacity for mobile 5G services. Consideration was given to the existing services in these frequency bands.

The Authority considered the need to balance facilitating the spectrum requirements of the existing PMTS providers to meet future consumer data demands and the introduction of a third PMTS provider. The spectrum caps in the Plan will allow the two existing PMTS providers to access additional spectrum, while ensuring access to, if authorised, a third mobile operator, in the existing bands. Aggregate spectrum caps were introduced to support the deployment of wider RF channels across contiguous spectrum while ensuring equal spectrum assignments across similar bands. This will allow PMTS providers to benefit from the spectral efficiency and cost-effectiveness of contiguous spectrum compared to carrier aggregation (Coleago Consulting 2021).

If a third PMTS provider is authorised, spectrum will be allocated in the 600 MHz (612–652/663–703 MHz) and extended 850 MHz (814–824 MHz/859–869 MHz) and spectrum caps will be established to ensure parity in the accommodation of the three mobile providers in the bands below 1 GHz, with all bands available to the three providers.

High-band spectrum will not be considered for public mobile telecommunications services at this time. The Plan may be revised to include high-band spectrum for the provision of public mobile telecommunications services when global deployments increase, end-user device and network equipment ecosystems mature, and there is local demand for that spectrum.

To adequately plan and optimally allocate the use of the 700 MHz, 850 MHz, 1900 MHz, 1.7/ 2.1 GHz, 2.5 GHz and lower 3.5 GHz bands for the accommodation of public mobile telecommunications services, the Authority considered:

1. the frequency bands allocated to mobile service, in accordance with ITU-R Region 2 *Table of Frequency Allocations* and the *Trinidad and Tobago Frequency Allocation Table* (TTFAT).

2. the spectrum used for licensed public mobile telecommunications services in Trinidad and Tobago.

3. the available spectrum to accommodate public mobile telecommunications services.

4. the appropriate licensing method for the assignment of spectrum to users.

5. the spectrum required to facilitate telecommunications infrastructure growth and the fulfilment of the national digital strategy.

These considerations, together with the current availability of spectrum in each of the respective bands, are summarised in Table 2.

Table 2. Frequency allocations for cellular mobile networks

ITU-R Recommended Frequency Range of Operation	Trinidad and Tobago Frequency Allocation Table (TTFAT)	Current Spectrum Availability
700 MHz band (698–806 MHz)	The frequency range 698–806 MHz is allocated in TTFAT to mobile and broadcasting services as co-primary services, and to fixed services as the secondary service.	The 700 MHz band is allocated to public mobile services, with two existing operators assigned spectrum in this band. 20 MHz is available in this band for the provision of public mobile telecommunications services. 10 MHz of spectrum is allotted for future use. 20 MHz of spectrum is allotted for the provision of public protection and disaster relief (PPDR) services.

ITU-R Recommended Frequency Range of Operation	Trinidad and Tobago Frequency Allocation Table (TTFAT)	Current Spectrum Availability
850 MHz band (824–849/869–894 MHz)	The frequency ranges 824–849/869–894 MHz span two frequency allocations in TTFAT: 806–890 MHz and 890–902 MHz Mobile service is the primary service in both ranges.	The 850 MHz band is allocated to public mobile telecommunications services, with the two existing operators assigned spectrum in this band. 12 MHz is available in this band for the provision of public mobile telecommunications services. 10 MHz is allotted for future use.
1900 MHz band (1850–1920/1930–2000 MHz)	The frequency ranges 1850–1920/1930–2000 MHz span four frequency allocations in TTFAT: 1710–1930 MHz, 1930–1970 MHz, 1970–1980 MHz and 1980–2010 MHz. Mobile service is the primary service in all the ranges.	The 1900 MHz band (1850–1910 MHz/1930–1990 MHz) is allocated to public mobile services, with the two existing operators assigned spectrum in this band. 40 MHz is available in this band for the provision of public mobile telecommunications services. Considering that the extended 1900 MHz band is now being utilised for the deployment of cellular services in ITU-R Region 2 countries, an additional 10 MHz (1910–1915 MHz and 1990–1995 MHz) is available in the 1900 MHz band for the provision of public mobile telecommunications services, subject to a spectrum audit to verify available spectrum.
1.7/2.1 GHz band (1710–1780/2110–2180 MHz)	The frequency ranges 1710–1755 MHz and 2110–2155 MHz span five frequency allocations in TTFAT: 1710–1930 MHz, 2110–2120 MHz, 2120–2160 MHz, 2160–2170 MHz and 2170–2200 MHz.	The 1.7/2.1 GHz band (1710–1755 MHz/2110–2155 MHz) is allocated to public mobile services, with the two existing operators assigned spectrum in this band. 60 MHz is available in this band for the provision of public mobile telecommunications services.

ITU-R Recommended Frequency Range of Operation	Trinidad and Tobago Frequency Allocation Table (TTFAT)	Current Spectrum Availability
	Mobile service is the primary service in all the ranges.	Considering that the extended 1.7/2.1 GHz band is now being utilised for the deployment of cellular services in ITU-R Region 2 countries, an additional 50 MHz (1755–1780 MHz and 2155–2180 MHz) is available in the 1.7/2.1 GHz band for the provision of public mobile telecommunications services, subject to a spectrum audit to verify available spectrum.
2.5 GHz band (2500–2690 MHz)	The frequency range 2500–2690 MHz spans four frequency allocations in TTFAT: 2500–2520 MHz, 2520–2655 MHz, 2655–2670 MHz and 2670–2690 MHz. Mobile service is the primary service in all the ranges.	The 2.5 GHz band is allocated to broadband wireless access (BWA) services, with the two existing operators assigned spectrum based on a TDD channel plan. There is 90 MHz of unassigned spectrum (contiguous) in this band.
Lower 3.5 GHz band (3.3–3.7 GHz)	The frequency range 3.3–3.7 GHz spans four frequency allocations in TTFAT: 3300–3400 MHz, 3400–3500 MHz, 3500–3600 MHz and 3600–3700 MHz. Mobile service is the primary service in all the ranges except 3300–3400 MHz.	The 3.3–3.4 GHz range is currently unassigned. The 3.4–3.7 GHz range is currently allocated to broadband wireless access services. Two existing licensees are assigned spectrum in the frequency range 3.4–3.6 GHz, based on a TDD channel plan. There is 250 MHz of unassigned (non-contiguous) spectrum in the lower 3.5 GHz band.

The Authority will complete monitoring exercises by September 2024 to verify that the additional spectrum in the 1900 MHz, 1.7/2.1 GHz, 2.5 GHz and lower 3.5 GHz bands are free from harmful interference before assignment of spectrum in these bands. Furthermore, the Authority is aware of the possibility of harmful interference with nearby countries. The *ITU-R Radio Regulations* articulates the procedures by which countries can conduct frequency notification, coordination and treatment of harmful interference across borders. The Authority will be guided by these procedures

should the need arise. As part of the implementation process, the Authority will issue the necessary notification to ITU-R upon assignment, which will enable and facilitate coordination processes with nearby countries when necessary.

In its continuing effort to make additional spectrum available for public mobile telecommunications services, and recognising the value of feedback from the industry, the Authority will consult with relevant stakeholders to assess any future candidate bands for public mobile telecommunications services. It is also the Authority's intention that other candidate IMT bands be considered for the provision of public mobile telecommunications services as demand and/or changes in the sector emerge.

3 Frequency Assignment Principles

The following principles undergird the frequency assignment plans for the accommodation of public mobile telecommunications services in Trinidad and Tobago:

1. The adopted frequency assignment plan for a specified band shall follow the relevant ITU-R recommendation, if applicable, and take into consideration the predominant frequency assignment plan utilised by mobile services in the particular frequency band.

2. All frequency assignment plans shall have a reference channel bandwidth that serves as the minimum assignable channel bandwidth. Frequency channels that require larger bandwidths can be achieved by concatenating multiple non-contiguous frequency channels of the reference channel bandwidth, which would equate to contiguous spectrum. All assignments to an operator shall be contiguous as far as possible.

3. Both frequency division duplexing (FDD) and time division duplexing (TDD) modes of operation will be supported and the frequency assignment plan shall specify the mode of operation.

4. Frequency assignments shall be made in accordance with the selected licensing process, as established by the Authority.

5. The frequency spectrum blocks or channels in a frequency assignment plan incorporate any necessary guard bands.

6. Spectrum caps shall be instituted in each band and across bands, to limit the quantum of spectrum assigned to an individual licensee. The spectrum cap is the maximum quantum of spectrum that can be assigned to a licensee in a specified frequency band or in aggregate across bands. The spectrum caps shall ensure that sufficient spectrum is available for assignment to three cellular mobile operators in the bands allocated to PMTS.

7. A licensee shall utilise the spectrum assigned in a manner that does not cause harmful interference to any other licensee. The licensee shall also employ in-band guard bands to mitigate harmful interference.

8. The maximum radio frequency (RF) output power limits may vary between different frequency bands, as propagation characteristics of the bands differ.

4 Frequency Assignment Plans for Public Mobile Telecommunications Services

The various frequency bands allocated for public mobile telecommunications services can be further subdivided into frequency channel allotments, predicated on the type(s) of technologies that can be employed, which will inform frequency assignment plans. These frequency assignment plans are aimed at maximising the efficient use of the allocated spectrum.

The following four subsections outline the various frequency ranges under consideration. Each subsection further outlines the frequency assignment plan, the recommended licensing process and conditions, and the technical operating conditions and specifications for the radiocommunications systems operating in the stated frequency band.

The actual availability of frequency channels for public mobile telecommunications services will be determined following a spectrum audit, prior to the implementation of the licensing process for each frequency band.

4.1 The 700 MHz Band (703–748/758–803 MHz)

4.1.1 Selection of the Frequency Assignment Plan

The propagation characteristics of the spectrum in the 700 MHz band and the allowable power limits make it conducive to serving consumers over a large area. Both 4G and 5G cellular mobile technologies are supported in the 700 MHz band.

There are two competing frequency assignment (channel) plans for the 700 MHz band. Figure 2 identifies the plans employed by the APT and the United States in the 700 MHz band.

The Authority adopted the APT 700 MHz band plan for the 700 MHz band, i.e., 3GPP band 28 (3GPP 2014), for the provision of public domestic mobile telecommunications networks and services, due to regional and global adoption of this band plan, which has driven significant growth in the device and network equipment ecosystems.

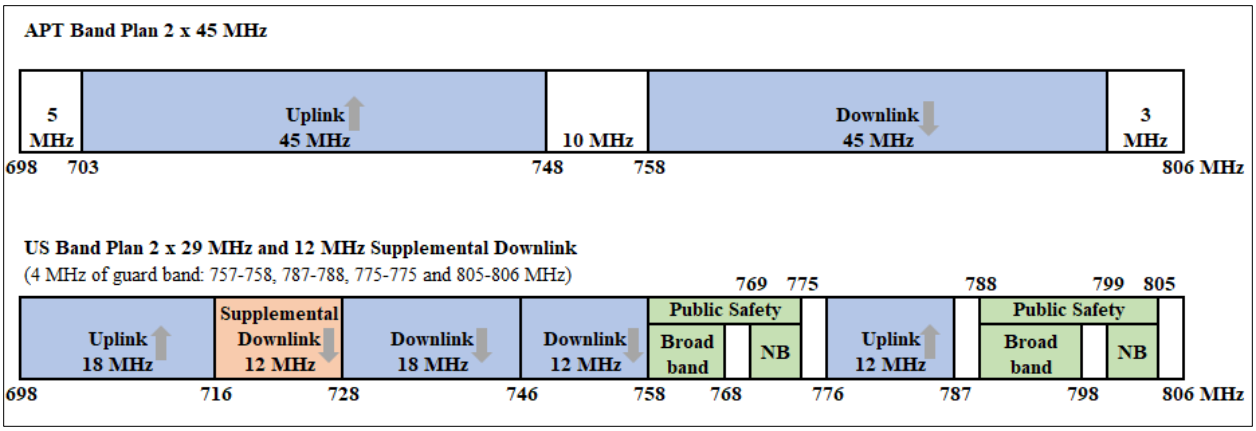

Figure 2. 700 MHz band plans

The ITU-R, at the World Radiocommunication Conference 2015 (WRC-15) (ITU-R 2016), modified Resolution 646: Public Protection and Disaster Relief (first approved in 2007 at WRC-07) and resolved to encourage administrations to:

1. use harmonised frequency ranges for PPDR to the maximum extent possible, taking into account national and regional requirements, and also allowing for consultation and cooperation with other concerned countries.

2. consider parts of the frequency range 694–894 MHz, as described in the most recent version of ITU-R Recommendation M.2015, when undertaking their national planning for PPDR applications, and broadband in particular, to achieve harmonisation.

It is within this context that consideration was given to the allocation of spectrum for PPDR within the frequency range 694–894 MHz, which is a designated range for IMT. Further to this, careful planning of the 700 MHz band (i.e., 698–806 MHz) is needed in ITU-R Region 2 countries (the Americas and the Caribbean), given the available mobile broadband technologies and the quantum of spectrum for allocation.

The US 700 MHz band plan is the only 700 MHz band plan that has a designated spectrum allocation for PPDR, i.e., the frequency range 788–798 MHz paired with 758–768 MHz for broadband PPDR, also known as 3GPP band 14 and 799–805 MHz paired with 769–775 MHz for narrowband PPDR. This band plan has been adopted by Canada, Bolivia, Nicaragua, the United States and some English-speaking Caribbean countries. However, the APT 700 MHz band plan does not have a designated spectrum allocation for PPDR. Hence, Region 2 countries that have adopted this plan, and wish to comply with the ITU resolution, require PPDR designations in the planning of the 700 MHz band.

For national security reasons, the Authority will maintain an exclusive allotment of 700 MHz spectrum for PPDR. Consistent with the quantum of spectrum allotted in the US 700 MHz band plan and the allotment by other jurisdictions for broadband PPDR, the Authority shall identify an allotment of 2 x 10 MHz in the 700 MHz band for PPDR.

4.1.2 Frequency Assignment Plan

The channel assignment plan outlined in Table 3 and Figure 3 shall be adopted for the 700 MHz band and shall only accommodate the FDD mode of operation.

Blocks A and B (i.e., 2 x 10 MHz) shall be allotted for the provision of PPDR. This allows blocks C – I (i.e., 2 x 5 MHz each) for assignment to cellular mobile operators.

This frequency assignment plan does not require the establishment of guard bands, as guard bands are established within the allotted spectrum blocks.

Table 3. Frequency assignment plan for 700 MHz band

Band	Frequency Range/MHz		Block Name
	Mobile Station Transmit	Base Station Transmit	
700 MHz	703–708	758–763	A
	708–713	763–768	B
	713–718	768–773	C
	718–723	773–778	D
	723–728	778–783	E
	728–733	783–788	F
	733–738	788–793	G
	738–743	793–798	H
	743–748	798–803	I

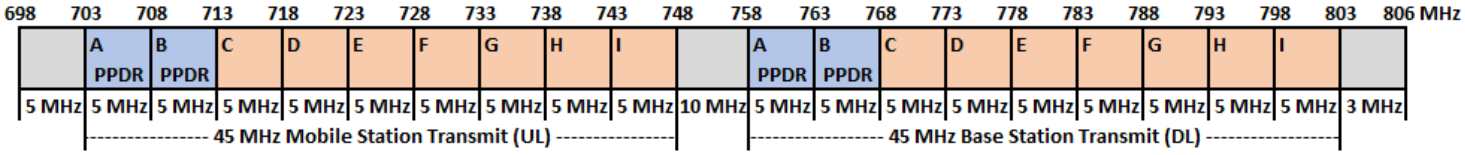

Figure 3. Frequency assignment plan for the 700 MHz band

4.1.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the 700 MHz band.

2. The licensing of spectrum in the 700 MHz band shall be for the provision of public mobile telecommunications services on a national basis, save and except for an allotment to PPDR.

3. A cellular mobile spectrum licence shall be granted by the Authority, in order for spectrum in the 700 MHz band to be assigned. The minimum assignment shall be 10 MHz, (i.e., 2 x 5 MHz).

4. The allocated spectrum in the 700 MHz band shall be licensed in accordance with the frequency assignment plan (see Table 3).

5. The spectrum cap for the 700 MHz band shall be 20 MHz (i.e., 2 x 10 MHz).

6. Each licensee assigned spectrum blocks in the 700 MHz and 850 MHz bands shall not exceed a total spectrum cap of 40 MHz (i.e., 2 x 20 MHz).

7. The assignment of spectrum to new spectrum licensees, or where there is preference for specified spectrum blocks, shall be via a competitive licensing process, as determined by the Authority.

8. The assignment of spectrum to existing and eligible concessionaires, where there is no preference for specified spectrum blocks, shall be via an assignment process determined by the Authority.

4.1.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the 700 MHz band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 4.

Table 4. Maximum technical operating specifications for the 700 MHz band[5]

Parameter	Constraint/Maximum Value	Comments
Base station maximum effective radiated power (ERP)	1000 W	The ERP shall not exceed 1000 W per emission.
Mobile station maximum ERP	3 W	Mobile stations shall employ a means to limit power to the minimum level necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique, e.g., BPSK and QPSK
Out-of-band emission limits	-43 dBW	Attenuation (α) on max power (P) of emissions calculated using: $\alpha = 43+10\log(P)$ (For base stations P=1000 W and for mobile stations P=3 W)
Standardisation	N/A	ETSI, FCC, Industry Canada

Notwithstanding the parameters identified in Table 4, amended or additional technical operating conditions may be instituted in accordance with the Act. These revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

[5] These specifications were developed in accordance with the *Code of Federal Regulations*, Title 47, Part 27 (i.e., FCC Rules).

4.2 The 850 MHz Band (824–849/869–894 MHz)

4.2.1 Selection of the Frequency Assignment Plan

Historically, two predominant band plans have existed globally for 2G IMT technology – the North American plan and the European plan. Administrations worldwide developed band plans that either adhere completely to one of these plans or use a blend of both designations. In North America, mobile telecommunications systems have operated in the 800 MHz (824–849/869–894 MHz) and 1900 MHz (1850–1910/1930–1990 MHz) frequency bands, whereas counterpart systems in Europe operated in the 900 MHz (880–915/925–960 MHz) and 1800 MHz (1710–1785/1805–1880 MHz) bands.

Trinidad and Tobago adopted the North American plan for the 850 MHz band. The 850 MHz band supports the implementation of various technologies, including 2G in the GSM-850 band, and UMTS, LTE and 5G in the 3GPP band 5/n5.

4.2.2 Frequency Assignment Plan

The Authority's channel assignment plan for the 850 MHz band shall be based on the North American plan, allowing for various technologies for the provision of public mobile telecommunications services, as shown in Table 5 and Figure 4. This channel assignment plan shall only accommodate the FDD mode of operation.

Blocks A to E shall be available for assignment to cellular mobile operators. This frequency assignment plan does not require the establishment of guard bands, as these are established, if required, within the allotted spectrum blocks.

Table 5. Frequency assignment plan for the 850 MHz band

Band	Frequency Range/MHz		Block Name
	Mobile Station Transmit	Base Station Transmit	
850 MHz	824–829	869–874	A
	829–834	874–879	B
	834–836.5	879–881.5	C'
	836.5–839	881.5–884	C"
	839–844	884–889	D
	844–849	889–894	E

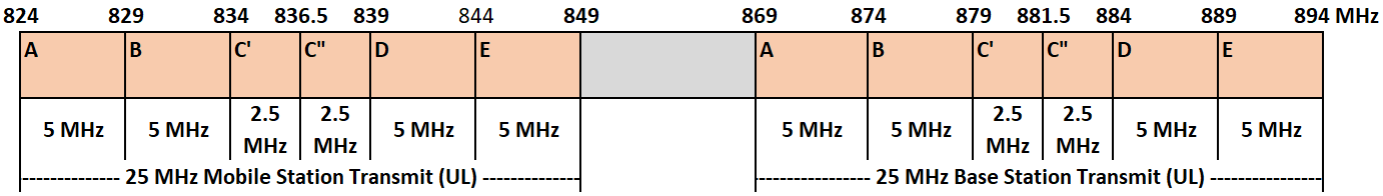

Figure 4. Frequency assignment plan for the 850 MHz band

4.2.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the 850 MHz band.

2. The licensing of spectrum in the 850 MHz band shall be for the provision of public mobile telecommunications services, on a national basis.

3. A cellular mobile spectrum licence shall be granted in order for spectrum in the 850 MHz band to be assigned.

4. The allocated spectrum in the 850 MHz band shall be licensed in accordance with the frequency assignment plan shown in Table 5. The minimum assignment shall be 10 MHz, i.e., 2 x 5 MHz.

5. The spectrum cap for the 850 MHz band shall be 20 MHz, (i.e., 2 x 10 MHz).

6. Each licensee assigned spectrum blocks in the 700 MHz and 850 MHz bands shall not exceed a total spectrum cap of 40 MHz (i.e., 2 x 20 MHz).

7. The assignment of spectrum, to new spectrum licensees or where there is preference for specified spectrum blocks, shall be via a competitive licensing process, as determined by the Authority.

8. The assignment of spectrum to existing and eligible concessionaires, where there is no preference for specified spectrum blocks, shall be via an assignment process prescribed by the Authority.

9. The reassigning of channels to the existing operators will be initiated to ensure contiguous assignments of spectrum, based on the revised channel plan.

4.2.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the 850 MHz band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 6.

Table 6. Maximum technical operating specifications for the 850 MHz band[6]

Parameter	**Constraint/Maximum Value**	**Comments**
Base station maximum ERP	500 W	The ERP shall not exceed 500 W per emission.
Mobile station maximum ERP	7 W	Mobile stations shall employ a means to limit power to the minimum necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique e.g., BPSK and QPSK
Out-of-band emission limits	-43 dBW	Attenuation (α) on max power (P) of emissions calculated using: $\alpha = 43+10\log(P)$ (For base stations P=500 W, and for mobile stations P=7 W)
Standardisation	N/A	ETSI, FCC, Industry Canada

Notwithstanding the parameters identified in Table 6, amended or additional technical operating conditions may be instituted in accordance with the Act. Such revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

[6] These specifications were developed in accordance with the *Code of Federal Regulations*, Title 47, Part 22 (i.e., FCC Rules).

4.3 The 1900 MHz Band (1850–1915/1930–1995 MHz)

4.3.1 Selection of the Frequency Assignment Plan

Trinidad and Tobago also adopted the North American plan for the 1900 MHz band. The 1900 MHz band, called the personal communications service (PCS) block in North America, is used throughout the region for the provision of mobile voice and data services. The North American allocation comprises two sub-bands – the lower sub-band and the upper sub-band. The sub-bands have been divided into nine paired blocks, namely, two 15 MHz blocks (blocks A and C) and seven 5 MHz blocks (blocks B1, B2, B3, D, E, F and G).

The 1900 MHz band supports the implementation of various technologies, including UMTS (3GPP band 2, 1850–1910/1930–1990 MHz, and 3GPP band 25, 1850–1915/1930–1995 MHz); LTE (3GPP band 2 and band 25); and 5G (3GPP band n2 and n25).

4.3.2 Frequency Assignment Plan

The Authority's assignment plan for the 1900 MHz band will be based on the North American PCS band plan, for the provision of public mobile telecommunications services, as shown in Table 7 and Figure 5. This channel assignment plan shall only accommodate the FDD mode of operation.

This frequency assignment plan does not require the establishment of guard bands, as these are established, if required, within the allotted spectrum blocks.

Table 7. Frequency assignment plan for the 1900 MHz band

Band	Frequency Range/MHz		Block Name
	Mobile Station Transmit	Base Station Transmit	
1900 MHz	1850–1865	1930–1945	A
	1865–1870	1945–1950	D
	1870–1875	1950–1955	B1
	1875–1880	1955–1960	B2
	1880–1885	1960–1965	B3
	1885–1890	1965–1970	E
	1890–1895	1970–1975	F
	1895–1910	1975–1990	C
	1910–1915	1990–1995	G

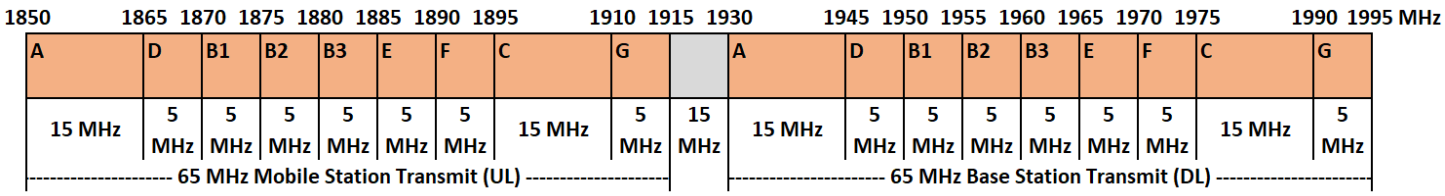

Figure 5. Frequency assignment plan for the 1900 MHz band

4.3.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the 1900 MHz band.

2. The licensing of spectrum in the 1900 MHz band shall be for the provision of public mobile telecommunications services, on a national basis.

3. A cellular mobile spectrum licence shall be granted in order for spectrum in the 1900 MHz band to be assigned.

4. The allocated spectrum in the 1900 MHz band shall be licensed in accordance with the frequency assignment plan shown in Table 7. The minimum assignment shall be 10 MHz (i.e., 2 x 5 MHz).

5. The spectrum cap for the 1900 MHz band shall be 80 MHz (i.e., 2 x 40 MHz).

6. Each licensee assigned spectrum blocks in the 1900 MHz and 1.7/2.1 GHz bands shall not exceed a total spectrum cap of 100 MHz (i.e., 2 x 50 MHz).

7. The assignment of spectrum to new spectrum licensees, or where there is a preference for specified spectrum blocks, shall be via a competitive licensing process, as determined by the Authority.

8. The assignment of spectrum to existing and eligible concessionaires, where there is no preference for specified spectrum blocks, shall be via an assignment process determined by the Authority.

4.3.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the 1900 MHz band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 8.

Notwithstanding the parameters identified in Table 8, amended or additional technical operating conditions may be instituted in accordance with the Act. Revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

Table 8. Maximum technical operating specifications for the 1900 MHz band[7]

Parameter	Constraint/Maximum Value	Comments
Base station maximum equivalent isotropically radiated power (EIRP)	1640 W/MHz	No more than 1640 W EIRP in any 1 MHz band segment
Mobile station maximum EIRP	2 W	Mobile stations shall employ a means to limit power to the minimum necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique e.g., BPSK and QPSK
Out-of-band emission limits	-43 dBW	Attenuation (α) on max power (P) of emissions calculated using: $\alpha = 43+10\log(P)$ (For base stations P=1640 W and for mobile stations P=2 W)
Standardisation	N/A	ETSI, FCC, Industry Canada

[7] These specifications were developed in accordance with the *Code of Federal Regulations*, Title 47, Part 24 (i.e., FCC Rules).

4.4 The 1.7/2.1 GHz Band (1710–1780/2110–2180 MHz)

4.4.1 Selection of the Frequency Assignment Plan

The 1.7/2.1 GHz band supports the implementation of different technologies, including UMTS (3GPP band 4, 1710–1755 MHz/2110–2155 MHz); LTE (3GPP band 4 and band 66, 1710–1780/2110–2200); and 5G (3GPP band n66, 1710–1780/2110–2200).

The Report and Order FCC 03-251 established rules to license the AWS band in North America in the 1710–1755 and 2110–2155 MHz frequency range (FCC 2003). Similarly, Report and Order FCC 14-31 established rules for the use of 1755–1780 and 2155–2180 (FCC 2014). Both bands 4 and 66 are used throughout ITU-R Region 2 countries for the provision of cellular mobile services. It should be noted that only up to 2180 MHz in band 66 is used for cellular mobile services, as 2180–2200 MHz is being considered for mobile-satellite service.

Trinidad and Tobago considers the extended AWS band (i.e., 1710–1780/2110–2180 MHz) based on 3GPP band 66/n66 suitable for allocation to public mobile telecommunications services, due to its adoption across ITU-R Region 2 and its large mobile handset ecosystem across multiple generations of cellular mobile technologies, including those that operate in the subset band 1710–1755/2110–2155 MHz band based on 3GPP band 4.

4.4.2 Frequency Assignment Plan

Fourteen paired 5 MHz spectrum blocks will be available for assignment. The frequency assignment plan for the AWS band plan is shown in Table 9 and Figure 6.

This frequency assignment plan does not require the establishment of guard bands, as these are established, if required, within the allotted spectrum blocks, and shall only accommodate the FDD mode of operation.

Table 9. Frequency assignment plan for the AWS band

Band	Frequency Range/ MHz		Block Name
	Mobile Station Transmit	Base Station Transmit	
1.7/2.1 GHz	1710–1715	2110–2115	A
	1715–1720	2115–2120	B
	1720–1725	2120–2125	C
	1725–1730	2125–2130	D
	1730–1735	2130–2135	E
	1735–1740	2135–2140	F
	1740–1745	2140–2145	G
	1745–1750	2145–2150	H
	1750–1755	2150–2155	I
	1755–1760	2155–2160	J
	1760–1765	2160–2165	K
	1765–1770	2165–2170	L
	1770–1775	2170–2175	M
	1775–1780	2175–2180	N

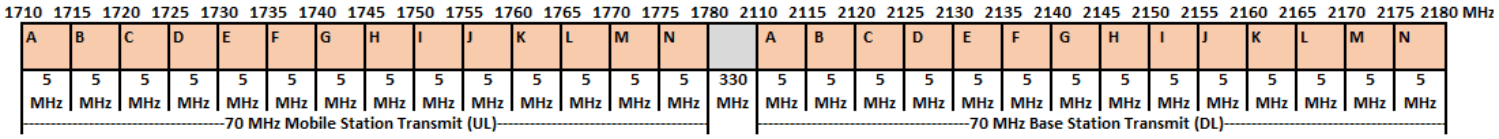

Figure 6. Frequency assignment plan for the AWS band

4.4.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the 1.7/2.1 GHz band.

2. The licensing of spectrum in the 1.7/2.1 GHz band shall be for the provision of public mobile telecommunications services on a national basis.

3. A cellular mobile spectrum licence shall be granted in order for spectrum in the 1.7/2.1 GHz band to be assigned.

4. The allocated spectrum in the 1.7/2.1 GHz band shall be licensed in accordance with the frequency assignment plan shown in Table 9.

5. The spectrum cap for the 1.7/2.1 GHz band will be 80 MHz (i.e., 2 x 40 MHz) per cellular mobile operator.
6. Each licensee assigned spectrum blocks in the 1900 MHz and 1.7/2.1 GHz bands shall not exceed a total spectrum cap of 100 MHz (i.e., 2 x 50 MHz).

7. The assignment of spectrum to new spectrum licensees, or where there is preference for specified spectrum blocks, shall be via a competitive licensing process, as determined by the Authority.

8. The assignment of spectrum to existing and eligible concessionaires, where there is no preference for specified spectrum blocks, shall be via an assignment process determined by the Authority.

4.4.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the AWS band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 10.

Notwithstanding the parameters identified in Table 10, amended or additional technical operating conditions may be instituted in accordance with the Act. Such revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

Table 10. Maximum technical operating specifications for the AWS band[8]

Parameter	Constraint/Maximum Value	Comments
Base station maximum EIRP	1640 W	No more than 1640 W EIRP in any 1 MHz band segment
Mobile station maximum EIRP	1 W	Mobile stations shall employ a means to limit power to the minimum necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique, e.g., BPSK and QPSK
Out-of-band emission limits	-43 dB	The power of any emission outside the licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43+10log (P). Attenuation (α) on max power (P) of emissions calculated using: $\alpha = 43+10\log(P)$ (For base stations P=1640 W and for mobile stations P=1 W)
Standardisation	N/A	FCC, Industry Canada

[8] These specifications were developed in accordance with the *Code of Federal Regulations*, Title 47, Part 22 (i.e., FCC Rules).

4.5 The 2.5 GHz Band (2496–2690 MHz)

4.5.1 Selection of the Frequency Assignment Plan

The 2.5 GHz band supports 3G, 4G and 5G cellular mobile technologies. There are two predominant frequency assignment plans for the 2.5 GHz band. Figure 7 presents the frequency arrangements that support both FDD and TDD in the 2.5 GHz band.

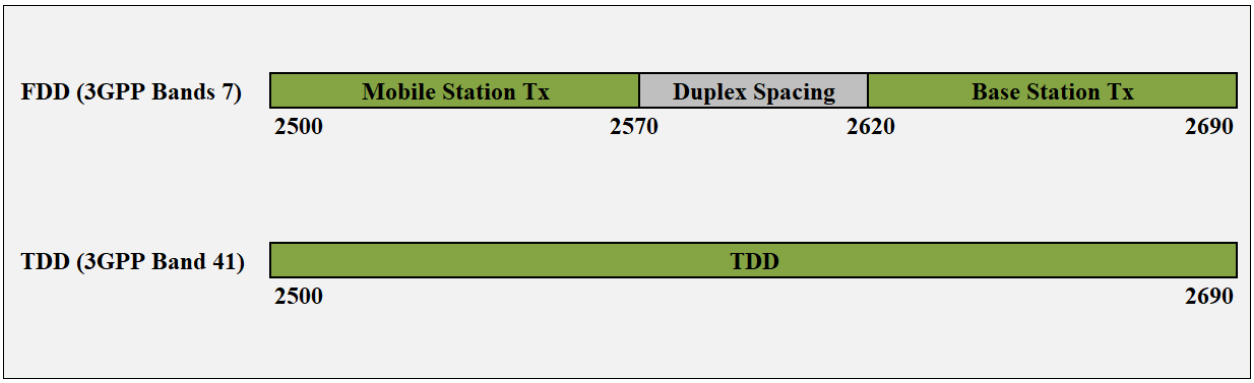

Figure 7. 2.5 GHz band plans

The FDD band plan contains a 50 MHz duplex spacing that can be used as a supplemental downlink band, aggregated with downlink spectrum from other bands. The duplex spacing could also be used for TDD operations, to deploy mixed FDD/TDD channels in the band.

The 2.5 GHz band is currently allocated to BWA service. There are assignments to two operators in the band, totalling 100 MHz. The BWA assignments are based on a TDD band plan. 90 MHz of contiguous spectrum is unassigned and available for assignment to cellular mobile operators in the frequency range 2600–2690 MHz.

Considering the spectrum that is available for assignment to cellular mobile operators, the FDD band plan was not considered for the 2.5 GHz band.

The TDD band plan for the 2.5 GHz band is based on 3GPP bands 41/n41 and supports the deployment of 4G and 5G IMT technologies. There is a mature 4G handset ecosystem that supports 3GPP band 41 and a growing 5G handset ecosystem that supports 3GPP band n41. With this channel assignment plan, the 90 MHz of contiguous and unassigned spectrum will be available for public mobile telecommunications services. Importantly, the *Spectrum Plan for the Accommodation of Broadband Wireless Access Services* will be revised and the spectrum allocation in the 2.5 GHz band for BWA services will be amended.

4.5.2 Frequency Assignment Plan

The Authority's assignment plan for the 2.5 GHz band will be based on the 3GPP TDD band 41/n41, for the provision of public mobile telecommunications services, as shown in Table 11 and Figure 8.

This frequency assignment plan does not require the establishment of guard bands, as these are established, if required, within the allotted spectrum blocks.

Table 11. Frequency assignment plan for the 2.5 GHz band

Band	Frequency Range/MHz	Block Name
	Mobile/Base Station Transmit	
2.5 GHz	2600–2645	A
	2645–2690	B

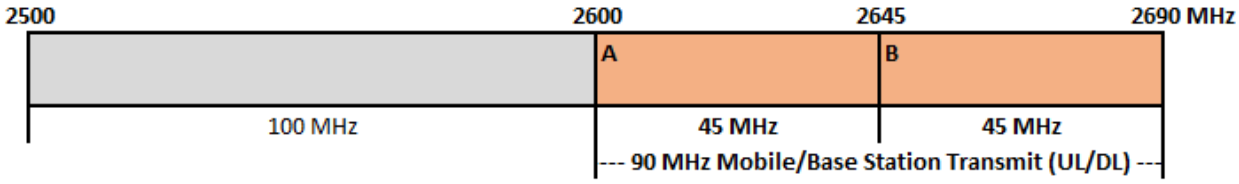

Figure 8. Frequency assignment plan for the 2.5 GHz band

4.5.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the 2.5 GHz band.

2. The licensing of spectrum in the 2.5 GHz band shall be for the provision of public mobile telecommunications services, on a national basis.

3. A cellular mobile spectrum licence shall be granted in order for spectrum in the 2.5 GHz band to be assigned.

4. The allocated spectrum in the 2.5 GHz band shall be licensed in accordance with the frequency assignment plan shown in Table 11. The minimum assignment shall be 45 MHz.

5. The spectrum cap for the 2.5 GHz band shall be 90 MHz.

6. Each licensee assigned spectrum blocks in the 2.5 GHz and lower 3.5 GHz bands shall not exceed a total spectrum cap of 100 MHz.

7. The assignment of spectrum shall be via a competitive licensing process which may include an auction, as determined by the Authority. Any fee determined from this process will be applied to any other spectrum in the entire 2.5 GHz band used for public mobile telecommunications services by an operator with a concession for the provision of a public domestic mobile telecommunications network and public telecommunications services.

4.5.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the 2.5 GHz band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 12.

Notwithstanding the parameters identified in Table 12, amended or additional technical operating conditions may be instituted in accordance with the Act. Revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

Table 12. Maximum technical operating specifications for the 2.5 GHz band[9]

Parameter	Constraint/Maximum Value	Comments
Base station maximum EIRP	1640 W/MHz	No more than 1640 W EIRP in any 1 MHz band segment
Mobile station maximum EIRP	2 W	Mobile stations shall employ a means to limit power to the minimum necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique, e.g., BPSK and QPSK
Out-of-band emission limits	Base stations: -43 dBW Mobile stations: -40 dBW	Attenuation (α) on max power (P) of emissions calculated using: α = 43+10log (P) for base stations For mobile stations, using: 1. α = 40+10log (P) from the channel edge to 5 MHz away 2. α = 43+10log (P) between 5 MHz and X MHz from the channel edge. 3. α = 55+10log (P) at X MHz and beyond from the channel edge. (X is the equipment occupied bandwidth) (Limit for base stations P=1640 W and for mobile stations P=2 W)
Standardisation	N/A	FCC, Industry Canada

[9] These specifications were developed in accordance with Standard Radio System Plan SRSP-517 and Radio Standards Specification RSS-199.

4.6 The Lower 3.5 GHz Band (3300–3700 MHz)

4.6.1 Selection of the Frequency Assignment Plan

The 3.5 GHz band (3.3–4.2 GHz) consists of mid-band spectrum that complements the sub-1 GHz and other lower bands to provide both capacity and coverage. The 3.5 GHz band is made up of the satellite C-band that is now primarily used for cellular mobile services and fixed wireless access (FWA) services. The lower 3.5 GHz band is considered prime spectrum for the deployment of IMT-2020 technology, due to the large quantum of spectrum in the band.

In keeping with the *Framework for Fifth Generation (5G) Public Mobile Telecommunications Networks*, the upper 3.5 GHz band (3.7–4.2 GHz) is not considered for allocation to public mobile telecommunications services because of the current licensees in the band in Trinidad and Tobago, and international references on 5G and radio altimeters coexistence. Only the lower 3.5 GHz band (3.3–3.7 GHz) will be considered for the allocation to public mobile telecommunications services.

Within the lower 3.5 GHz band, BWA network operators are assigned spectrum in the range 3.4–3.6 GHz, totalling 100 MHz. There are also assignments in 3.6–3.7 GHz for other services. A total of 200 MHz of spectrum in the ranges 3.3–3.4 GHz and 3.55–3.65 GHz is available for PMTS. Spectrum in the range 3.4–3.55 GHz will remain available for BWA services.

The *Spectrum Plan for the Accommodation of Broadband Wireless Access Services* will be revised and the spectrum allocation in the 3.5 GHz band for BWA services will be amended.

Only a frequency assignment plan that supports a TDD mode of operation can be considered for the lower 3.5 GHz band. 3GPP band n78 (3.3–3.8 GHz), a subset of n77 (3.3–4.2 GHz), includes the lower 3.5 GHz band. The band only supports 5G technology and has a growing handset ecosystem.

4.6.2 Frequency Assignment Plan

The Authority's frequency assignment plan for the lower 3.5 GHz band is a subset of the 3GPP TDD band n78 and is shown in Table 13 and Figure 9.

This frequency assignment plan does not require the establishment of guard bands, as these are established, if required, within the allotted spectrum blocks.

Table 13. Frequency assignment plan for the lower 3.5 GHz band

Band	Frequency Range/MHz	Block Name
	Mobile/Base Station Transmit	
3.5 GHz	3300–3350	A
	3350–3400	B
	3550–3600	C
	3600–3650	D

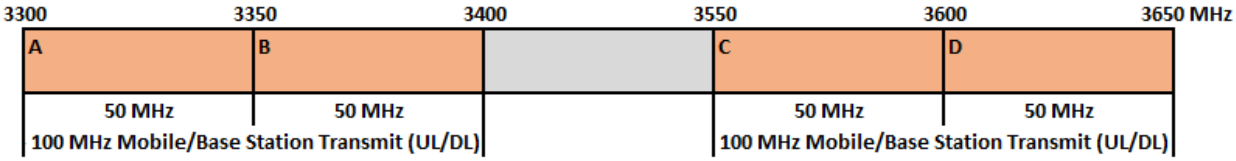

Figure 9. Frequency assignment plan for the lower 3.5 GHz band

4.6.3 Licensing Process and Conditions

The rules for licensing are as follows:

1. A concession for the provision of a public domestic mobile telecommunications network and public telecommunications services is a prerequisite for the assignment of spectrum in the lower 3.5 GHz band.

2. The licensing of spectrum in the lower 3.5 GHz band shall be for the provision of public mobile telecommunications services, on a national basis.

3. A cellular mobile spectrum licence shall be granted in order to assign spectrum in the lower 3.5 GHz band.

4. The allocated spectrum in the lower 3.5 GHz band shall be licensed in accordance with the frequency assignment plan shown in Table 13. The minimum assignment shall be 50 MHz.

5. The spectrum cap for the lower 3.5 GHz band shall be 100 MHz.

6. Each licensee assigned spectrum blocks in the 2.5 GHz and lower 3.5 GHz bands shall not exceed a total spectrum cap of 100 MHz.

7. The assignment of spectrum shall be via a competitive licensing process which may include an auction, as determined by the Authority.

4.6.4 Technical Operating Conditions and Specifications

To operate public mobile telecommunications services in the lower 3.5 GHz band, licensees shall not exceed the maximum technical operating conditions and specifications identified in Table 14.

Table 14. Maximum technical operating specifications for the lower 3.5 GHz band[10]

Parameter	Constraint/Maximum Value	Comments
Base station maximum EIRP	1640 W/MHz	No more than 1640 W EIRP in any 1 MHz band segment
Mobile station maximum EIRP	1 W	Mobile stations shall employ a means to limit power to the minimum necessary for successful communication.
Modulation scheme	Digital	Any digital modulation technique, e.g., BPSK and QPSK
Out-of-band emission limits	-43 dBW	
Standardisation	N/A	FCC, Industry Canada

Notwithstanding the parameters identified in Table 14, amended or additional technical operating conditions may be instituted in accordance with the Act. Revisions shall be identified in the schedule of the licence document for the specific radiocommunications technology deployed.

[10] These specifications were developed in accordance with the *Code of Federal Regulations*, Title 47, Part 27 (i.e., FCC Rules).

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