BELIZE:

ORDER made by the Public Utilities Commission (hereinafter referred to as "the Commission") in exercise of the powers conferred upon it by the Belize Telecommunications Act, Chapter 229 of the Laws of Belize, and all other powers thereunto the Commission enabling and to repeal the General Authorization for Operation of Equipment or Devices Utilizing The 2.4 GHz and 5 GHz Radio Frequency Bands Order (no 2 of 2020).

Short title.

1. This Order may be cited as the:

GENERAL AUTHORIZATION FOR OPERATION OF EQUIPMENT OR DEVICES UTILIZING THE 900 MHZ, 2.4 GHZ AND 5 GHZ RADIO FREQUENCY BANDS ORDER (NO. 1 OF 2021 TELECOMMUNICATIONS SECTOR)

Repeal

2. The General Authorization for Operation of Equipment or Devices Utilizing The 2.4Ghz and 5Ghz Radio Frequency Bands Order (no 2 of 2020) is herewith repealed as of the effective date of this Order.

Interpretation.

3. (1) In this Order, unless the context otherwise requires:

"Carrier Aggregation" means a technology to combine two or more carriers into one data channel to enhance the data capacity in the same or different radio frequency bands;

"dynamic frequency selection (DFS)" means a mechanism that dynamically detects signals from other systems and avoids co-channel operation with these systems, notably radar systems;

"GHz" means giga-hertz;

"harmful interference" means any emission, radiation or induction that endangers the functioning of a radio navigation service or other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this Order or other relevant legislation;

"incidental radiators" means devices that generate radio frequency energy during the course of their operation but are not intentionally designed to generate or emit that energy, including but not limited to motors and mechanical light switches;

"Internet of Things" or "IoT" means a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies" (Recommendation ITU-T3Y .2060)

"ISM Application" means the operation of equipment or appliances designed to generate and use local radio-frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications.

"intentional radiators" means devices that intentionally generate and emit radio frequency energy by radiation or induction, including but not limited to cordless telephones, remote control toys, and other low power transmitters;

"MHz" means mega-hertz; "Licensee(s)" means, in the context of this General Authorisation, all persons licensed under this General Authorisation;

"LoRa" means the physical layer or the wireless modulation utilized to create the long range communication link based on a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology.

"LoRa device" means long range, low power wireless platform for IoT networks worldwide.

"LoRaWAN" means the definition of the communication protocol and system architecture for the LoRa network.

"point-to-point (P2P) system" means a system that establishes a connection between two end points only, provided that such systems may be cascaded geographically, including in the form of a ring;

"point-to-multipoint (PMP) system" means a system that establishes connections between a single specified point and more than one other specified point;

"Transmit Power Control (TPC)" means a feature that enables a U-NII device to dynamically switch between several transmission power levels in the data transmission process;

"unintentional radiators" means devices that generate and use radio frequency energy within the device but are not intended to emit radio frequency energy by radiation or conduction, including but not limited to

devices such as personal computers, printers, disk drives, other digital devices that have internal "clocks" or circuitry used for timing within the device, TV interface devices such as VCRs, radio receivers such as TV receivers and AM/FM radios, and carrier current systems;

"written direction" means any written instructions given to, or any written obligation placed on, or written thing required of licensees.

(2) In this General Authorisation, any word or expression shall, unless the context otherwise requires, have the meaning assigned to them in this Authorisation, the Belize Telecommunications Act, the Public Utilities Commission Act or any Regulations made thereunder.

Licence and Authorisation.

4. (1) The Commission hereby grants to all persons in Belize save those natural persons who are not adults, non-exclusive Licence to operate the types of equipment or devices inclusive of, but not limited to, point-to-point or point-to-multipoint applications that meet the technical specifications under the terms and conditions contained herein.

(2) The Commission hereby grants to all persons in Belize save those natural persons who are not adults, non-exclusive Licence to utilize the radio frequency bands specified in the Schedules under the terms and conditions contained herein, solely for the purpose of operating the types of equipment or devices specified in order *4.(1)* above.

General Provisions.

5. This General Authorisation and any Licence granted in accordance herewith, and the legal relations between the Licensee and the Commission and any claim instituted by the Licensee or the Commission with respect to matters arising herein, shall be governed by and construed in accordance with the Laws of Belize.

6. Nothing in this General Authorisation or any Licence granted in accordance herewith shall absolve the Licensee from any requirement in law to obtain such additional consents, permits or licences as shall be necessary for the importation, installation, operation and maintenance of the equipment or devices specified in order *4. (1)*.

7. All relevant equipment and devices shall have the required type approval certification and shall be designed, constructed, installed, maintained, operated and used in conformance with applicable technical specifications, including those provided in the Schedule, and international standards as existing at the time.

8. A person licensed only in accordance with this General Authorisation and who does not otherwise hold a separate Licence granted by the Commission shall only deploy relevant equipment or devices singularly or as parts of a

network on singular premises owned or occupied by him. Such persons shall not deploy networks across multiple premises.

9. If any provision in or obligation under this General Authorisation is considered invalid, illegal or unenforceable by a Court of competent jurisdiction, such judicial decision as regards such invalidity shall not be held by the Commission to otherwise impact the legality or unenforceability of any other provision in or obligation under this Authorisation and any Licence issued thereunder.

10. There is no prescribed process for applying for, or for the publication of any prescribed public notice in relation to an application for, any licence, in order for any relevant person to exercise their rights and obligations under this General Authorisation.

11. Licensees, including persons licensed only in accordance with this General Authorisation, shall register all equipment and devices for outdoor deployment and operation in a form prescribed by the Commission within five (5) days of such deployment.

12. Licensees, including persons licensed only in accordance this General Authorisation, shall report any re-configuration of, or network changes associated with, all registered equipment and devices for outdoor deployment and operation in a form prescribed by the Commission within five (5) days of such reconfiguration or change.

13. Use of the relevant radio frequency bands is on a secondary shared basis. No exclusive assignments are allowed for any person, whether for private, public, or commercial use save and except for PUC approved assignments to services identified to primary allocations.

14. Licensees, including persons licensed only in accordance with this General Authorisation, must adhere to the technical operational specifications applicable to each radio frequency band's operating range as contained in the Schedule.

15. Licensees, including persons licensed only in accordance with this General Authorisation, shall not be deemed to have any vested or recognizable right to continued use of any portion of the relevant radio frequency bands by virtue of prior registration or certification of relevant equipment and devices.

16. Operation of an intentional, unintentional, or incidental radiator is subject to the condition that no harmful interference is caused by such operation and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical equipment or by an incidental radiator.

17. The operator of a radio frequency device operating in the relevant radio frequency bands shall be required to cease operating the device upon notification by the Commission that the device is causing harmful interference. In such cases, operation shall not resume until the condition causing the harmful interference has been corrected to the satisfaction of the Commission.

18. Carrier Aggregation solutions by persons authorized by an appropriate licence granted by the Commission to provide wireless telecommunications services to the public, inclusive but not limited to LTE-U and LAA, consisting of relevant radio frequency bands with other assigned radio frequency bands is strictly forbidden.

Penalty

19. Any violation of the provisions of this General Authorisation, including technical specifications for use of the relevant radio frequency bands, shall be deemed by the Commission to be unlicensed use and shall result in seizure of devices and claims by the Commission for the recovery of costs associated with enforcing compliance. Furthermore, such unauthorized use may be subject to other penalties as provided for under the Belize Telecommunications Act or relevant legislation made thereunder.

Administrative Fees

20. The Commission may levy such fees for the registration of the outdoor end point equipment utilized in P2P systems and the outdoor single specified point utilized in PMP systems for the deployment and operation in the relevant radio frequency bands as may be included in any applicable Byelaws made from time to time under the Belize Telecommunications Act.

21. Licensees, including persons licensed only in accordance with this General Authorisation, shall provide such information with regards to relevant equipment, devices or networks requested by the Commission in the form and at the times specified by the Commission.

22. This General Authorisation may be amended at any time by the Commission, subject to the Belize Telecommunications Act or relevant legislation made thereunder.

23.This General Authorisation does not authorize any person to provide telecommunications services to any member of the public.

Written direction.

24. Licensees, including persons licensed only in accordance with this General Authorisation, shall comply with any written direction given to him by the Commission in relation to the exercise of his rights and obligations under this General Authorisation.

Effective date. 25. This Order shall come into effect on the date of its making.

MADE by the Public Utilities Commission this 23rd Day of July, 2021.

(DEAN MOLINA)
Chairman, Public Utilities Commission

SCHEDULE

AUTHORIZED RADIO FREQUENCY BANDS

The Radio Frequency Bands for which Licence is granted under this General Authorisation consist of the following:

- 902 – 928 MHz
- 2400 – 2495 MHz
- 5150 – 5250 MHz
- 5250 – 5350 MHz
- 5470 – 5725 MHz
- 5725 – 5850 MHz

The 5350 – 5470 MHz band is allocated to earth exploration – satellite, radiolocation, aeronautical radionavigation and space research services per ITU-R Region 2 Radio Regulations allocations and is not authorized for use under this General Authorisation.

Technical Specifications for the 900 MHz Band (902 – 928 MHz)

Users shall abide by the operational specifications identified in the following table:

Parameter	Maximum Value	Comments
Maximum Peak Conducted Output Power	Frequency Hopping Spread Spectrum (FHSS): (1) 1 Watt (30 dB) (2) 0.25 Watts (23.98 dB) Digital Modulation: 1 Watt (30 dB) CHIRP Spread Spectrum Modulation (CSS): TX UP:+20dBm (30dBm allowed) TX Down:+27dBm	FHSS: (1) at least 50 hopping channels (2) less than 50 hopping channels but at least 25 hopping channels. Digital Modulation: Based on Maximum Conducted power (Highest total transmit power occurring in any mode) CSS Modulation power limits for LoRa devices.
Antenna Gain	6 dBi	If antennas of directional gain greater than 6 dBi are used, conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi
Modulation scheme	Digital	Any digital modulation technique e.g. BPSK, QPSK, CHIRP
Minimum Channel Bandwidth	Frequency Hopping Spread Spectrum (FHSS): (20dB) - 25kHz	20dB BW < 250kHz: 50 hopping freqs - average time of occupancy not greater than 0.4s within 20s period. 20dB BW > 250 kHz: 25 hopping freqs - average time of occupancy not greater than 0.4s within 10s period.
Minimum Channel Bandwidth	Digital Modulation Techniques: (6dB) - 500kHz	
Minimum Channel Bandwidth	CHIRP Spread Spectrum Modulation (CSS): 125/500 kHz (BW UP) 500 kHz (BW Down)	Used by LoRa devices.
LoRaWAN Channels	64 + 8 + 8	Used by LoRa devices according to the US band plan for 902-928 MHz.
Frequency Range	902 - 928 MHz	
Maximum Emissions outside of Band	Spread spectrum or Digitally modulated	In any 100 kHz bandwidth outside the frequency band, the Radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest desired power based on RF conducted or a radiated measurement.

		30db below that in the 100 kHz BW if conducted power limits based on RMS averaging over a time interval.
Maximum Spectral Power density	Digitally Modulated Systems	The power spectral density shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Technical Specifications for the 2.4 GHz Band (2400 – 2483.5 MHz)

Users shall abide by the operational specifications identified in the following table.

Parameter	Maximum Value	Comments
Maximum Effective Radiated Power ERP (i.e. RF Output of Transmitter)	30 dBm (1 Watt)	For frequency hopping systems employing less than 75 hopping channels ERP shall be no greater than 20.97 dBm.
Antenna Gain	6 dBi	For every dB gain above 6 dBi, ERP of RF transmitter shall be reduced by 1 dBm.
Maximum Effective Isotropic Radiated Power – EIRP	36 dBm (4 Watts)	
Exceptions only for fixed, P2P systems **Maximum Effective Isotropic Radiated Power - EIRP (i.e. RF Output power plus Antenna Gain)**	EIRP can be increased above 36 dBm (4 Watts).	For every 3 dBi increase above 6dBi, the ERP of RF transmitter shall be reduced by 1 dBm. This exception excludes PMP, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information.
Modulation scheme	Digital	Any digital modulation technique e.g. BPSK, QPSK
Multiple Access Technique	Frequency Hopping Spread Spectrum (FHSS) Direct Sequence Spread Spectrum (DSSS)	Any other multiple access technology that can co-exist with FHSS and DSSS systems can be employed.
Minimum Channel Bandwidth	FHSS (20 dB) - 25kHz DSSS (6 dB) - 500kHz	FHSS shall use at least 15 well defined, non-overlapping channels separated by the channel bandwidth. The dwell time per channel shall not exceed 0.4s within a period of 0.4n, where n is the number of channels employed.
Frequency Range	2400.00 -2483.5 MHz	This frequency range can be used for either indoor or outdoor operation.
Maximum Emissions outside of Band	Spread spectrum or Digitally modulated	In any 100 kHz bandwidth outside the frequency band, the Radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest desired power.
Maximum Spectral Power density	Digitally Modulated Systems	The power spectral density shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Technical Specifications for 5.0 GHz Band (5150-5850 MHz)

Users shall abide by the operational specifications identified in the following table.

<table>
<tr><th>Frequency Range (MHz)</th><th>5150-5250</th><th>5250-5350</th><th>5470-5725</th><th>5725-5850</th></tr>
<tr><td>Condition of Operation</td><td colspan="4">Indoor/Outdoor, Master/Client, mobile/portable, and fixed device, unless otherwise noted</td></tr>
<tr><td rowspan="2">Max Conducted TX Power</td><td>30 dBm (1W) for master device</td><td colspan="2" rowspan="2">24 dBm (250 mW) or 11 dBm + 10 log B, whichever is lower (B=26-db emission BW)</td><td rowspan="2">30 dBm (1W)</td></tr>
<tr><td>24 dBm (250 mW) for client device</td></tr>
<tr><td rowspan="3">Max_EIRP</td><td>4 W (36 dBm) with 6 dBi antenna</td><td colspan="2" rowspan="3">1W (30 dBm) with 6 dBi antenna</td><td rowspan="2">4 W (36 dBm) with 6 dBi antenna</td></tr>
<tr><td>200 W (53 dBm) for fixed P2P applications with 23 dBi antenna. Fixed, P2P operations exclude the use of PMP systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.</td></tr>
<tr><td>Additional rule for outdoor operation: Max_EIRP< 125 mW (21 dBm)</td><td>No EIRP limit for fixed P2P application (i.e., no antenna gain limit). Fixed, P2P operations exclude the use of PMP</td></tr>
</table>

			systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.
TX power reduction (dBm-by-dBi) required when antenna exceeds …	> 6dBi	> 6dBi	> 6dBi
	> 23 dBi for fixed P2P application		Not required for P2P application with any antenna gain
Dynamic Frequency Selection (DFS) Required?	No	YES, for master device with Detection Threshold of -64 dBm for 200 mW (23 dBm) ≤ Operating_EIRP≤ 1W (30 dBm); -62dBm for Operating EIRP< 200 mW(23 dBm) and PSD must be < 10 dBm/MHz. Device must sense for radar signals at 100% of its emission BW	No
		NO, for client device	
Transmit Power Control (TPC) required?	No	YES, if Max_EIRP ≥ 500 mW (27 dBm) and able to lower EIRP below 24dBm	No
		NO, if Max_EIRP< 500mW (27dBm)	
Minimum BW requirement	N/A		6-dB BW ≥ 500 kHz

Technical Standards for the Operation of ISM Applications

A. Operating frequencies.

ISM equipment may be operated in the following frequency bands by ISM equipment:

ISM frequency	Tolerance
915 MHz	±13.0 MHz
2,450 MHz	±50.0 MHz
5,800 MHz	±75.0 MHz

B Field strength limits.

(a) ISM equipment operating on a frequency specified in § A. above is permitted unlimited radiated energy in the band specified for that frequency.
(b) The field strength levels of emissions which lie outside the bands specified in A, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous).	Any ISM frequency.....	Below 500.....	25.....	300
		500 or more.....	25xSQRT (power/500)....	[1]300
	Any ISM frequency.....	Below 500	15.....	300
		500 or more	15xSQRT (power/500)....	[1]300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz...	Any.....	10.....	1600
	Above 5,725 MHz.....	Any.....	([2]).....	([2])
Medical diathemy.....	Any ISM frequency.....	Any.....	25.....	300
	Any ISM frequency.....	Any.....	15.....	300
Ultrasonic.....			24,000/F(kHz).....	
		Any.....	15.....	30
	490 to 1,600 kHz.....	Any.....		30
	Above 1,600 kHz.....			

[1]Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.
[2]Reduced to the greatest extent possible.

c) The field strength limits for RF lighting devices shall be the following:

Frequency (MHz)	**Field strength limit at 30 meters (μV/ m)**
Non-consumer equip-ment:	
88–216	50
216–1000	70
Consumer equipment:	
88–216	15
216–1000	20

Additional Notes for Power Limits

Intentional radiators used as field disturbance sensors are limited to the following field strengths:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/ meter)	Field strength of harmonics (millivolts/ meter)
902–928	500	1.6
2435 - 2465	500	1.6
5785 - 5815	500	1.6