



Enabling the future of wireless connectivity.

Last update: January 27, 2022 – introduction section

Application Note for FCC testing and certification of Helium Compatible Gateways

Reference: [Semtech Application Note AN1200.26](#)

Reference: 47 CFR § 15.243 - [Operation in the band 890-940 MHz](#)

Introduction

For FCC certification, both LoRaWAN and Helium PoC frequencies are required. It is the responsibility of manufacturers wishing to provide Helium network compatible products to ensure that these parameters are followed.

- (for LoRaWAN) 500kHz DTS mode: 923.3 - 927.5 MHz, must test conducted output power up to 27dBm/ ~0.6 Watts
- (for Helium PoC) 125kHz FHSS (< 50 channels) or HyBrid Mode: 902.3 - 914.9 MHz, must test conducted output power up to 21dBm/ ~0.09 Watts
 - Please note: When hopping over 50 channels or more the device is allowed to transmit at 1W (30dBm). However, for Helium PoC, we are hopping over 8 channels so this is not applicable.

FCC Recertification Abstract

Helium's PoC beacon transmission on 125Khz channels (currently on channels 8-15 (sub-band 2), per LoRaWAN regional parameters specification) is a modification to the transmission mode of a "regular" 8-channel LoRaWAN gateway operating in the US915 band.

A Helium compatible gateway (miner) uses an additional transmission mode on frequencies that are not covered in Semtech's FCC pre-scan documentation and results for their "Corecell" LoRaWAN concentrator card. Helium gateways using FCC pre-certified SX1301, SX1302, SX1303, SX1308 mini PCIe cards are likely to be operating outside of the specific modes supported by the module's FCC grant.

Standard LoRaWAN gateways transmit only using the 500kHz DTS mode in the upper frequency band (923.3 - 927.5Mhz). However, Helium's PoC function has the gateways additionally transmitting in a subset of the 902.3 – 914.9Mhz range on 125kHz channels, which falls under a different FCC classification - a Frequency Hopping Spread Spectrum System. Therefore any Helium gateway needs to be treated as what the FCC calls a Hybrid System: a Frequency Hopping Spread Spectrum System or a Digital Transmission System. This is similar to the FCC certification guidelines that a LoRaWAN endpoint uses. Furthermore, under the FHSS System, when hopping on 125Khz channels, the conducted output power shall not exceed 21dBm, unless when hopping over 50 channels or more, which is not achievable on a gateway with only 8 channels.

Conclusion

If you copied the Semtech "Corecell" LoRaWAN miniPCIe reference design and procedure for FCC testing, it is very likely that you will need to recertify for FCC since the Semtech reference design was screened for the DTS

mode only. Please refer to the above referenced Semtech Application note AN1200.26 for more information on DTS, FHSS and Hybrid systems and suggested test modes.

Recommendations

- Contact your LoRaWAN concentrator card supplier to confirm FCC grant coverage or consider asking them to extend FCC test coverage to support Helium PoC functions.
- Alternatively you can seek an updated FCC grant directly by re-submitting your product to your FCC test house of choice to include the Frequency Hopping System mode that covers the PoC beacons.
- Review Semtech Application notes:
 - [LoRa and FCC Part 15.247: Measurement Guidance](#)
 - [AN1200.62 Best Practices for FCC Pre-Compliance testing of LoRaWAN Modules](#)