FCC / ISED Transmission information

Both devices “Officesense 2” and “Desksense” share the same transmitter and network stack, the transmission specification are identical.

Modulation / Operating frequency and datarate information:

The modulation type used is called LoRa. This is a Frequency-Hopping, Spread-Spectrum (FHSS) modulation. And functions as the physical/datalink network layers. On top of this the LoRaWAN network stack is implemented functioning as the network transport and session layers (The network stack used is developed and tested by Semtech according to the LoRawan specifications 1.0.3). These documents contain a detailed description of the modulation used, operating frequency en data rate.

For more information refer to attachments:

“lorawan1.0.3.pdf”

“lorawan1.0.3 Regional parameters.pdf”

For USA and Canada, the devices are hardcoded to use the “US902-928MHz ISM Band” LoRaWAN configuration, refer to section 2.5 of “lorawan1.0.3 Regional parameters.pdf” for more information.

Example:

2.5.2 US902-928 Channel Frequencies

The 915 MHz ISM Band SHALL be divided into the following channel plans.

- Upstream – 64 channels numbered 0 to 63 utilizing LoRa 125 kHz BW varying from DR0 to DR3, using coding rate 4/5, starting at 902.3 MHz and incrementing linearly by 200 kHz to 914.9 MHz
- Upstream – 8 channels numbered 64 to 71 utilizing LoRa 500 kHz BW at DR4 starting at 903.0 MHz and incrementing linearly by 1.6 MHz to 914.2 MHz
- Downstream – 8 channels numbered 0 to 7 utilizing LoRa 500 kHz BW at DR8 to DR13, starting at 923.3 MHz and incrementing linearly by 600 kHz to 927.5 MHz

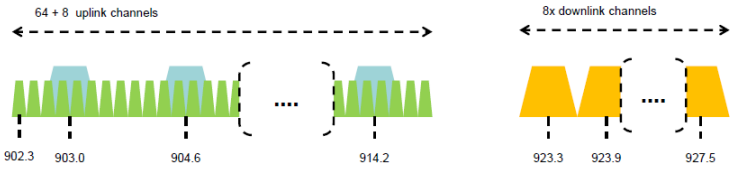

Figure 1: US902-928 channel frequencies

2.5.3 US902-928 Data Rate and End-device Output Power encoding

FCC regulation imposes a maximum dwell time of 400ms on uplinks. The ***TxParamSetupReq*** MAC command is not implemented by US902-928 devices.

The following encoding is used for Data Rate (**DR**) and End-device conducted Power (**TXPower**) in the US902-928 band:

DataRate	Configuration	Indicative physical bit rate [bit/sec]
0	LoRa: SF10 / 125 kHz	980
1	LoRa: SF9 / 125 kHz	1760
2	LoRa: SF8 / 125 kHz	3125
3	LoRa: SF7 / 125 kHz	5470
4	LoRa: SF8 / 500 kHz	12500
5:7	RFU	
8	LoRa: SF12 / 500 kHz	980
9	LoRa: SF11 / 500 kHz	1760
10	LoRa: SF10 / 500 kHz	3900
11	LoRa: SF9 / 500 kHz	7000
12	LoRa: SF8 / 500 kHz	12500
13	LoRa: SF7 / 500 kHz	21900
14	RFU	
15	Defined in LoRaWAN[12]	

Table 13: US902-928 TX Data rate table

Antenna information:

“Officesense 2”

Model ID	Model/variant/region	Notes
P191114	Officesense_2_Comfort_USA	Same HWID for Canada
P191115	Officesense_2_Presence_USA	Same HWID for Canada

*The RF-sections of the PCB for both models are identical.

The “Officesense 2” employs a planar (PCB-antenna) inverted-F antenna. The antenna is part of the PCB and cannot be changed or disconnected from the transmitter.

“Desksense”

The “Desksense” uses a planar (PCB-antenna) meandering monopole antenna. The antenna is part of the PCB and cannot be changed or disconnected from the transmitter.

Model ID	Model/region	Notes
P190202	Desksense_US	Same HWID for Canada