**LoRa/LoRaWAN Important Tables**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  |  |  | **EU 863-870MHz ISM Band** | | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 01 (LoRa Physical bit rate, Payload size)** | | | | | |  |
|  |  |  |
|  |  |  | | | | | |  |
|  |  | **Data Rate** | **Configuration** | | **Physical bit rate** | **Max. MAC Payload size** | **Max. Frame Payload Size** |  |
|  |  |  |
|  |  |  | **Modulation** | **Bandwidth** |  |  |  |  |
|  |  | 0 | SF12 | 125kHz | 250 | 59 | 51 |  |
|  |  | 1 | SF11 | 125kHz | 440 | 59 | 51 |  |
|  |  | 2 | SF10 | 125kHz | 980 | 59 | 51 |  |
|  |  | 3 | SF09 | 125kHz | 1760 | 123 | 115 |  |
|  |  | 4 | SF08 | 125kHz | 3125 | 230 | 222 |  |
|  |  | 5 | SF07 | 125kHz | 5470 | 230 | 222 |  |
|  |  | 6 | SF07 | 250kHz | 11000 | 230 | 222 |  |
|  |  | 7 | FSK | 50kbps | 50000 | 230 | 222 |  |
|  |  | 8-15 | RFU | | | | |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 02 (LoRa Default time parameters)** | | |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |
|  |  | RECEIVE\_DELAY1 | | 1sec |  |  |  |  |
|  |  | RECEIVE\_DELAY2 | | 1sec |  |  |  |  |
|  |  | JOIN\_ACCEPT\_DELAY1 | | 5sec |  |  |  |  |
|  |  | JOIN\_ACCEPT\_DELAY2 | | 6sec |  |  |  |  |
|  |  | MAX\_FCNT\_GAP | | 16384 |  |  |  |  |
|  |  | ADR\_ACK\_LIMIT | | 64 |  |  |  |  |
|  |  | ADR\_ACK\_DELAY | | 32 |  |  |  |  |
|  |  | ACK\_TIMEOUT | | random delay (1,2,3 sec) |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 03 (LoRa Join Request Message parameters)** | | | | | |  |
|  |  |  |
|  |  |  | | | | | |  |
|  |  | **Modulation** | **Bandwidth** | **Channel Frequency** | **Bit rate** | **Narrowband Channels** | **Duty Cycle** |  |
|  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | LoRa | 125kHz | 864.10MHz | DR0 - DR5/ 0.3 to 5 kbps | 6 | <0.1% |  |
|  |  | 864.30MHz |  |
|  |  | 864.50MHz |  |
|  |  | 868.10MHz |  |
|  |  | 868.30MHz |  |
|  |  | 868.50MHz |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 04 (LoRa RX1(receiver window 1) Data Rate** | | | | | | |
|  |  |
|  |  |  | | | | | | |
|  |  |  | Uplink Data Rate | | | | | |
|  |  |
|  |  | RX1DROffset | 0 | 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |  |  |  |
|  |  | DR0 | DR0 | DR0 | DR0 | DR0 | DR0 | DR0 |
|  |  | DR1 | DR1 | DR0 | DR0 | DR0 | DR0 | DR0 |
|  |  | DR2 | DR2 | DR1 | DR0 | DR0 | DR0 | DR0 |
|  |  | DR3 | DR3 | DR2 | DR1 | DR0 | DR0 | DR0 |
|  |  | DR4 | DR4 | DR3 | DR2 | DR1 | DR0 | DR0 |
|  |  | DR5 | DR5 | DR4 | DR3 | DR2 | DR1 | DR0 |
|  |  | DR6 | DR6 | DR5 | DR4 | DR3 | DR2 | DR1 |
|  |  | DR7 | DR7 | DR6 | DR5 | DR4 | DR3 | DR2 |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 05 (LoRa Retransmission Data Rates)** | | |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |
|  |  | **Retransmission Number** | | **Data Rate** |  |  |  |  |
|  |  | 1st | | DR |  |  |  |  |
|  |  | 2 | | DR |  |  |  |  |
|  |  | 3 | | max (DR-1,0) |  |  |  |  |
|  |  | 4 | | max (DR-1,0) |  |  |  |  |
|  |  | 5 | | max (DR-2,0) |  |  |  |  |
|  |  | 6 | | max (DR-2,0) |  |  |  |  |
|  |  | 7 | | max (DR-3,0) |  |  |  |  |
|  |  | 8 | | max (DR-3,0) |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  | **Table 06 (LoRa Required SNR)** | | |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |
|  |  | **DR/SF** | | **SNR** |  |  |  |  |
|  |  | DR0/SF12 | | -20 |  |  |  |  |
|  |  | DR1/SF11 | | -17.5 |  |  |  |  |
|  |  | DR2/SF10 | | -15 |  |  |  |  |
|  |  | DR3/SF09 | | -12.5 |  |  |  |  |
|  |  | DR4/SF08 | | -10 |  |  |  |  |
|  |  | DR5/SF07 | | -7.5 |  |  |  |  |