433 MHz vs. 2.4 GHz – Comparison

Because a lot of people ask me this question, I will list all I know. If anything is wrong or anything is missing please let me know; I welcome any corrections.

1. Distance:

    Theoretically, 2.4 GHz will transmit farther than 433 MHz in open space; under the same transmission power and paired antennas.

    a). The difference is in the length of the antenna: 433MHz needs at least 15cm of antenna, 2.4 GHz needs 3cm.

    b). Sometimes 433 MHz is made with RLC; how much transmission power does it have?? Only the designer knows. Others may or may not know.

2. Encryption:

433MHz currently only has 150 Kbps Data Transfer Rate; to encrypt this is very difficult.

3. Paring:

433 MHz has no paring. When you send a signal, your neighbor receives the same message. Plus there is no encryption, so everyone knows about it… that doesn't really work.

4. Channel-Hopping:

433 MHz has narrow bandwidth, it doesn't support channel-hopping, and everything is interfering with one another.

In comparison, 2.4 GHz has a broader bandwidth, Wi-Fi using 20MHz per band, has 13~14 channel possibilities. Therefore, it can channel-hop and avoid interference.

5. Power Consumption:

IoT devices all transfer small amounts of data: Data Rate transferring at 250 Kbps (2.4GHz) vs. 150 Kbps (433 MHz), for sure the 250 Kbps will take less time to transfer the same amount of data. Less time = less power consumed.

6. Software Protocol:

433 MHz is narrowband, typically having only one encoder per type of sensor. If you have 10 door/window (contact) sensors and one is triggered, you will not know which one is triggered. Our 2.4 GHz system can tell you which one was triggered.

7. Battery Status:

A lot of 433 MHz sensors are made with RLC; there are some controls that cannot be added. There's no status on the battery level, you have to check it yourself. Our 2.4 GHz sensors will check the battery status; our system will send you a simple push notification when the batteries are low.

8. Price:

Our 2.4 GHz RF products are completely handled by IC; it has high-reliability and is competitively-priced versus 433 MHz.

9. Half-duplex/ Full-duplex:

2.4 GHz is full-duplex. 433 MHz are mostly half-duplex. (Meaning communication only travels one-way.) Full-duplex has a lot of functions that half-duplex cannot achieve.

Looking at all these comparisons, would you still choose 433 MHz to be in your product line?