RIIM Technology Comparison: What Makes RIIM Mesh Best?

RIIM by Radiocrafts vs ZigBee vs Wi-SUN vs LoRa

RIIM vs ZigBee

• RIIM offers longer range and better building penetration properties because it uses sub-GHz frequency bands as opposed to the 2.4 GHz frequency band used by ZigBee.

• RIIM uses TSCH (time-synchronized channel hopping) which provides more reliable communication and scalability in areas with high device density compared to CSMA/CS which is used in ZigBee.

• RIIM is designed for industrial use while Zigbee is designed for consumer applications.

• RIIM handles more devices in a single network compared to ZigBee.

• RIIM networks are easier to commission because they handle channel assignments automatically while ZigBee requires manual channel assignment.

RIIM vs Wi-SUN

• RIIM uses TSCH while Wi-SUN uses USCH (unsynchronised channel hopping). USCH is best for devices that are in motion. For networks with stationary devices, TSCH offers a huge advantage in reducing interference and packet collisions.

• RIIM uses a unique technology called Polite Spectrum Access which combines Adaptive Frequency Agility and Listen-Before-Talk features, allowing for 37x higher data capacity in Europe.

• RIIM can be tuned for customer specific requirements, for example, putting solar trackers into safe position in dangerous weather conditions, while Wi-SUN is a standard that is not easily tweakable.

• RIIM offers accurate time information, reducing the need for GPS based timekeeping. Wi-SUN is inherently unsynchronised.

RIIM vs LoRa

• RIIM is designed for industrial SCADA while LoRa is optimized for infrequent sensor reporting.

• RIIM has the same data capacity downlink and uplink, while LoRa has a severely limited downlink.

• RIIM firmware over-the-air updates takes a maximum of 3 minutes while LoRa takes much longer.

• RIIM is time synchronised, so it offers higher reliability in large networks where it is of paramount importance to avoid interference and packet collisions. LoRa is not time synchronised, meaning it will suffer from more frequent packet collisions and interference.

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TSCH – Time Sychronised Channel Hopping

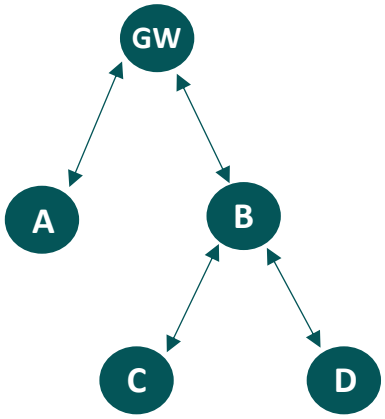
Time Sychronised Channel Hopping was introduced in IEEE 802.15.4-2015 as a frequency hopping mode and has been added as a new PHY/MAC layer to our Sub-GHz mesh solution, RIIM.

TSCH works by sending data transmissions at several frequencies from a pre-set frequency list and at different time slots in a synchronised schedule. If a packet is lost between two devices, it is re-sent on a different channel in the next available time slot.

Therefore, TSCH ensures mesh radios have plenty of safe margin, including in environments with narrow noise or significant interference, creating a mesh network with minimal packet collisions and high reliability.

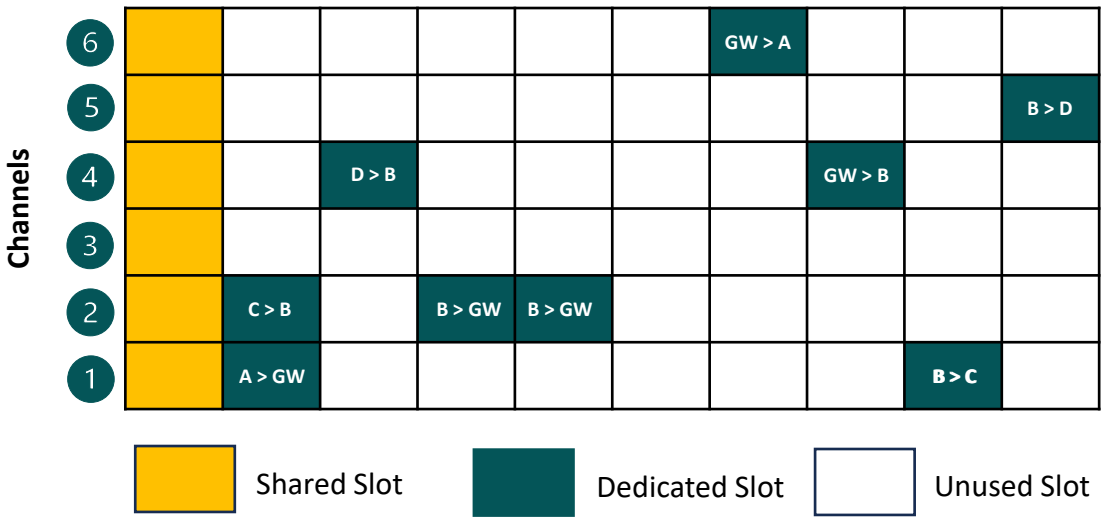
TSCH has a proven track record of 99.99% successful data packet delivery rates, allowing you to design a highly scalable and reliable mesh network.

Routing Tree



GW = Gateway
A/B/C/D = Network Devices

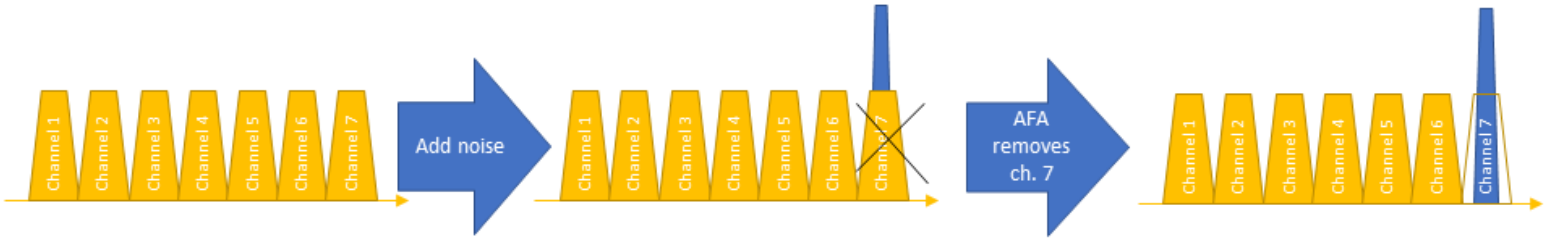
Time Slots Showing Communication Schedule



Polite Spectrum Access For Massive Data Throughput

The ISM/SRD bands are being used by a lot of devices competing for the same spectrum

- The Adaptive Frequency Agility feature scans all channels for noise and stops using the channels with most noise
- Listen-Before-Talk (LBT) before each transmission to avoid packet collisions
- Polite spectrum access = Adaptive Frequency Agility + LBT
- With Polite spectrum access the modules can send 37 times more data, and still be within EU-regulation



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