SIMPLE BROCHURE

Wi-Fi 7 Multi-Link for IoT

Enhance link reliability with adaptive band switching to mitigate congestion and interference

infineon

Table of contents

1 What is Wi-Fi 7 Multi-Link for IoT?

Wi-Fi 7 for IoT takes wireless performance to the next level with Multi-Link Operation (MLO), allowing seamless data transmission and reception across 2.4 GHz, 5 GHz, and 6 GHz bands simultaneously. Unlike traditional devices that associate with one band at a time, Wi-Fi 7 Multi-Link for IoT devices can associate with multiple bands concurrently, eliminating the need to disconnect and re-associate while switching bands. This ensures a more reliable connection, lower latency, and improved performance in interference-prone environments.

Advanced features like adaptive band switching and band selection optimization further ensure devices dynamically transition to the best band in real time to avoid congestion and interference, making Wi-Fi 7 ideal for IoT use cases in smart homes, industrial settings, and beyond.

2 Why Adaptive Band Switching and Multi-Link Operation are Essential

Wi-Fi environments are increasingly complex with varying degrees of congestion, interference, and dynamic channel quality. MLO and adaptive band switching address these challenges by increasing reliability, improving user experience, and enhancing connectivity even in the most crowded and challenging wireless environments.

2.1 Advantages of MLO for Reliability and Latency

- Seamless Multi-Band Connectivity: Wi-Fi 7 eliminates the need to disconnect and re-associate to different bands, improving latency and reducing data interruptions.
- Dynamic Channel Adaptation: Real-time transitions between 2.4 GHz, 5 GHz, and 6 GHz based on current congestion ensure consistent performance.
- Latency-Sensitive Applications: MLO helps prevent jitter and packet loss, ensuring optimal performance for AR/VR, gaming, teleconferences, and robotic controls.
- Energy Efficiency: Devices stay connected and consume less energy by using the optimal band for their communication needs.

Many IoT devices are constrained by cost, power consumption, and physical size. Instead of multi-chain radio implementations, IoT devices can implement MLO in a single radio to achieve adaptive band switching using a single radio and antenna. Fast band switching implemented in silicon allows dynamic transitions between 2.4 GHz, 5 GHz, and 6 GHz operation while minimizing system complexity. This approach reduces implementation cost while still improving link robustness and latency performance in congested environments.

3 ACW741x Adaptive Band Switching and Multi-Link Operation

Infineon's AIROC™ ACW741x is a family of ultra-low-power, tri-radio, single chip devices—featuring Wi-Fi 7, Bluetooth® Low Energy 6.0, and 802.15.4 for Thread/Matter. Designed for IoT and smart home applications, ACW741x combines high transmit power capability, robust receive sensitivity, and range-enhancing PHY features to deliver reliable connectivity in congested environments.

The ACW741x supports Wi-Fi 7 Multi-Link for IoT which includes adaptive band switching, enabling the device to transition quickly to the best band to avoid congestion and interference.

3.1 Supported Bands

The AIROC™ ACW741x Wi-Fi 7 solution supports efficient connectivity across 2.4 GHz, 5 GHz, and 6 GHz bands, leveraging the unique strengths of each to optimize performance and reliability for IoT applications:

- 2.4 GHz

- Ideal for legacy IoT devices and use cases requiring extended range and better penetration through walls or obstacles. However, this band is often congested due to heavy usage in smart homes and other IoT deployments.
- 5 GHz
  - Balances bandwidth and range, with less interference than 2.4 GHz. It's widely deployed in residential and enterprise environments for applications requiring moderate throughput and speed over mid-range distances.
- 6 GHz
  - The newest and cleanest spectrum available, offering high bandwidth and reduced interference. This band is perfect for latency-sensitive applications but has shorter range due to higher attenuation.

Adaptive Band Switching minimizes overhead and steers traffic to the most reliable, lowest-latency band when encountering interference or congestion.

3.2 ACW741x Performance

ACW741x is the industry's first Wi-Fi 7 tri-radio device optimized for 20 MHz-only channels, ideal for IoT applications. It features Multi-Link for IoT and adaptive-band switching to dynamically steer traffic across the most optimal and least congested 2.4 GHz, 5 GHz, and 6 GHz bands—without the need to disconnect and re-associate. These advanced capabilities ensure reliable, low-latency, and power-efficient connectivity for IoT devices leveraging Wi-Fi 7.

Public

Version: V1.0_EN

Date: MM/2025

Stay connected!

Scan QR code and explore offering

www.infineon.com