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CONNECTED INTELLIGENCE

Wi-Fi and Bluetooth LE Enhance Whitegoods and Smart Appliances

Enhancing Smart Functionality in Whitegoods and Kitchen Appliances through Wi-Fi and Bluetooth LE Integration

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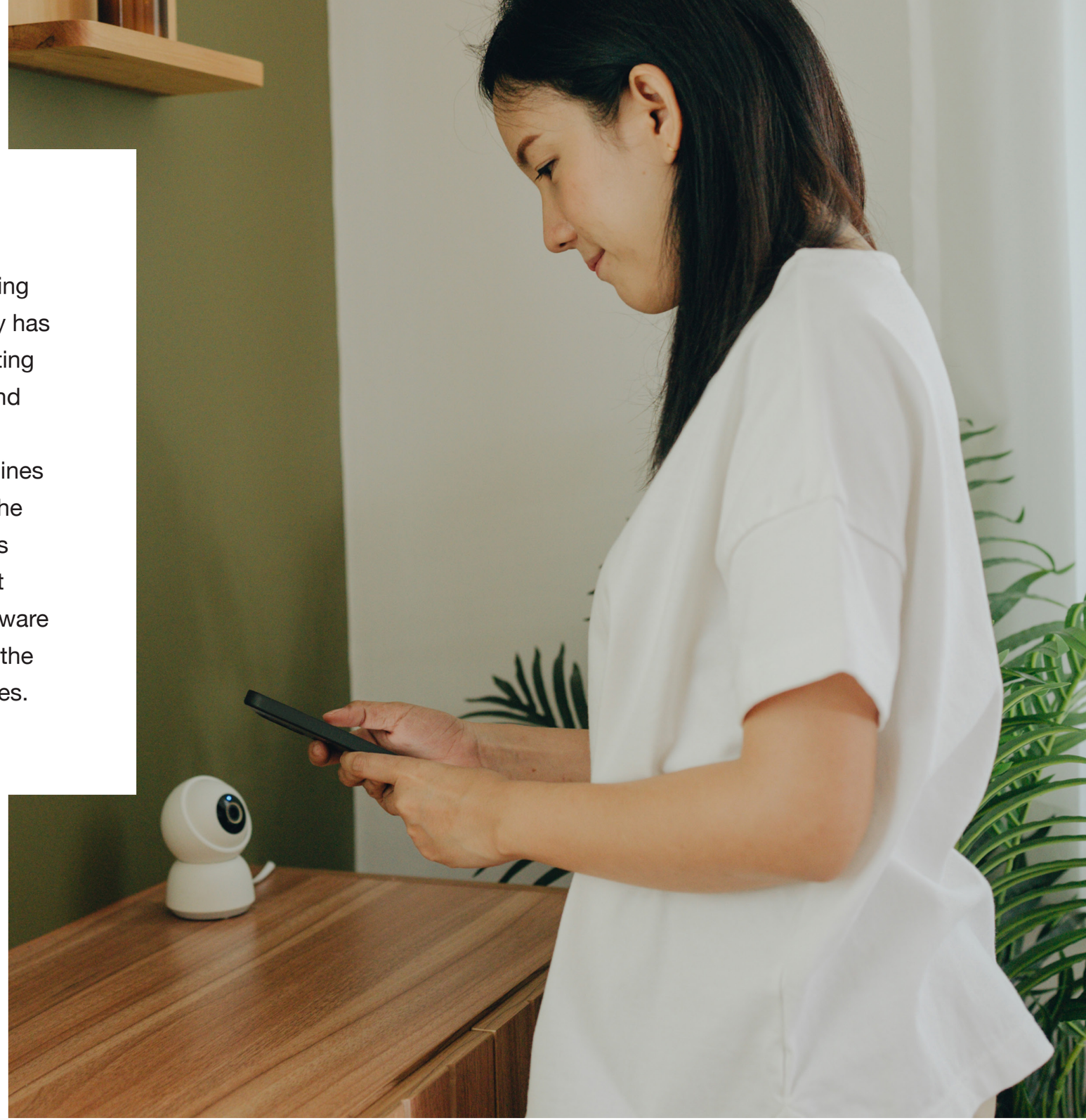
Abstract

The utility and convenience that smart home devices bring to our day-to-day lives is hard to overstate. Connectivity has become a key consideration for consumers when selecting whitegoods and kitchen appliances. Integrating Wi-Fi and Bluetooth Low Energy (LE) is bringing forward new use cases and expectations for features like automated routines and predictive maintenance. This whitepaper explores the integration of these technologies into household devices and highlights the value of smart functionality and smart home ecosystem integration. We also examine the hardware and software benefits of each technology, emphasizing the advantages of Silicon Labs solutions for smart appliances.



Introduction

The modern smart home landscape is evolving rapidly, with smart appliances playing a pivotal role in transforming everyday experiences and efficiency. Smart appliances, equipped with advanced connectivity features, offer unparalleled convenience, efficiency, and automation.

Connectivity empowers users to manage appliances from anywhere—enabling scheduling, maintenance alerts, and energy insights that drive convenience and efficiency. The global smart appliances market is expected to grow at a CAGR o 17% 2024 -2029 for High performance wireless (Wi-Fi + Bluetooth), according to OMDIA reports. Today 20–25% of large household appliances have built-in internet connectivity. By 2035, it's projected that 60–80% of whitegoods appliances will come with wireless connectivity. Remote control, predictive maintenance, access to energy usage are a few factors driving market urgency which we will go into deeper detail later in this whitepaper.

Wi-Fi and Bluetooth LE are two critical technologies driving this transformation. Wi-Fi, known for its high bandwidth and robust connectivity, is ideal for data-intensive tasks such as cloud connectivity, secure OTA (over-the-air) firmware updates and remote diagnostics. Bluetooth LE, with its low power consumption and secure communication capabilities, is perfect for localized control and seamless device onboarding.

This whitepaper delves into the technical advantages of integrating Wi-Fi and Bluetooth LE into whitegoods and kitchen appliances. It explores how these technologies enhance smart functionality, focusing on key aspects such as remote control, automated routines, predictive maintenance, and energy monitoring. Furthermore, it highlights the role of AI and machine learning in predictive maintenance, showcasing their ability to prevent appliance failures, extend product lifespans, and reduce maintenance costs.

Silicon Labs solutions, including the Silicon Labs SiWx917 Wi-Fi 6 wireless MCU for smart appliances and whitegoods and the Silicon Labs BG22 and BG27 Bluetooth LE solutions for kitchen appliances, offer superior connectivity, security, and energy efficiency. By the end of this whitepaper, readers will have a comprehensive understanding of the benefits of integrating Wi-Fi and Bluetooth LE into smart appliances and how Silicon Labs solutions can accelerate innovation in this space.

Enabling Smart Appliance Functionality

Enhanced User Experience

Wi-Fi connectivity allows users to control their appliances remotely via mobile applications. For instance, a user can start their dishwasher while still at work, ensuring clean dishes upon arrival home. Real-time notifications provide updates on cycle completion, maintenance needs, or potential issues—empowering users with timely insights and the ability to respond quickly.

Automated Routines

Integrated Wi-Fi and Bluetooth LE connectivity allows appliances to interface with mobile and cloud platforms, enabling remote operation that is growing the demand for convenience and efficiency. Appliances can be integrated into existing ecosystems in the house like Amazon Alexa or Google Home. In this way configuring a routine becomes simple with the gateway issuing commands to different appliances in the house. A coffee maker, for example, can start brewing coffee automatically at a scheduled time every morning when a user asks the smart home assistant to do so. Refer to our Matter dishwasher demo for further insight.

Predictive Maintenance

AI and machine learning algorithms analyze appliance data to predict failures before they occur. This proactive approach minimizes downtime, extends appliance lifespans, and reduces maintenance costs for both consumers and manufacturers. For example, in a washing machine, AI models can help analyze usage patterns to predict wear and tear, improper functioning of a part etc., and send an alert to the user. Part replacement can also be predicted prompting the user to place an order for a new part.

Energy Monitoring

With support for the Matter protocol, appliances can monitor and report energy consumption in real-time. This empowers users to track energy usage and make informed decisions to optimize energy efficiency, as seen in Matter-enabled dishwashers. Matter-enabled appliances expose attributes such as energy consumption, cycle duration via clusters, and endpoints defined in the Matter specification. These attributes are reported to a central controller using reporting/subscribe queries. Then AI/ML models are used to suggest strategies such as running the dishwasher in off peak hours so that the user can optimize usage to lower utility bills. For more information about Matter energy management, read our article, How Matter 1.3 can power our tomorrow.

Technical Benefits of Wi-Fi and Bluetooth LE

Wi-Fi:

Wi-Fi is ideal for tasks requiring high bandwidth, such as secure OTA firmware updates, remote diagnostics, and cloud connectivity. It ensures seamless updates and real-time monitoring without disruptions.

Always-on and higher bandwidth data-intensive tasks

802.11ax (Wi-Fi 6) is the version of the specification enabling IoT optimizations, offering a theoretical maximum throughput of 9.6 Gbps—significantly higher than the 3.5 Gbps of Wi-Fi 5 and 600 Mbps of Wi-Fi 4. However, such high data rates are excessive and power-inefficient for many end devices like household appliances, which typically only require low-bandwidth, reliable connections. In most cases, a 20 MHz channel with a single spatial stream using MCS0 to MCS7 is more than sufficient to meet the modest data requirements of these devices. The true value of Wi-Fi 6 for whitegoods lies not in peak speed but in advanced features like Target Wake Time (TWT), MU-MIMO, and OFDMA. These technologies improve network efficiency and reduce power consumption by allowing devices to wake and transmit only when needed, share spectrum effectively, and maintain reliable connections without interfering with other devices in the home. All these strategies help with longer battery life and lower standby current consumption.

A Wi-Fi 6-enabled refrigerator can efficiently stream live images of produce inventory to the cloud—typically requiring less than 1 Mbps—while a connected stovetop can instantly alert users if left on too long using just a few kb/s. As the number of connected devices in homes continues to rise, Wi-Fi 6 is rapidly gaining traction in the appliance market.

Reliability of OTA firmware updates

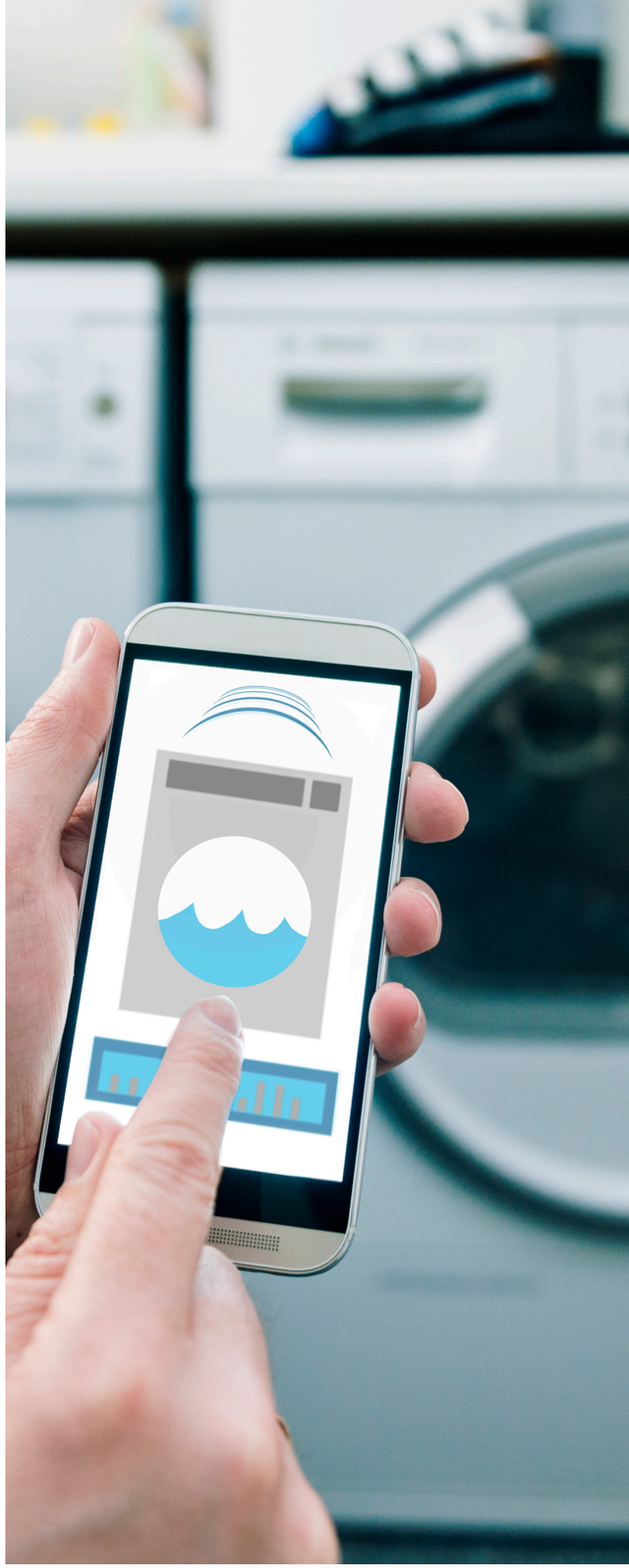
Smart appliances serve many years in the field and its critical to enable secure and convenient updates to the system software and firmware remotely. Reliable OTA firmware update capability transforms smart appliances into dynamic, secure, and future-proof platforms. They ensure ongoing device security, allow rapid deployment of critical patches, and enable feature enhancements post-deployment, significantly extending product lifespans. They improve user experience by fixing bugs remotely without service calls, reducing support costs, and maintaining customer trust. Advanced OTA techniques preserve the previous image so even if the OTA process is interrupted, devices are safeguarded against being bricked. In this way appliances are always updated to the latest and secure software.

Imagine loading your dishwasher when a few indicator lights blink briefly before everything returns to normal. What you've witnessed is a seamless OTA firmware update. The appliance has automatically downloaded the latest firmware from the cloud, ensuring it stays current with new features, performance improvements, and security updates. Wi-Fi 6 plays a critical role in this process by enabling high-speed, low-latency downloads of large update files without interruptions—delivering a smooth, reliable update experience for the user.

Security

Wi-Fi 6 doesn't just mean faster speeds—it also means better security. As part of the Wi-Fi 6 certification, WPA3 support is mandatory. This is significant because WPA3 brings stronger encryption, protection against brute-force attacks, and forward secrecy so even if someone captured your data, they couldn't decrypt it later.

And yes, malicious hackers are out there scanning for the easiest way into your network, often through the most overlooked devices—like your smart coffee maker or connected toothbrush. It might sound like a joke, but unsecured appliances have been used in real-world attacks. With WPA3 built into Wi-Fi 6 appliances, you get all the convenience of a connected home, with enterprise-grade security working quietly in the background. It's like upgrading your locks without changing your lifestyle.



Bluetooth LE

Bluetooth LE plays a critical role in smart appliances by enabling seamless, low-power connectivity for device setup, control, and maintenance. By combining Wi-Fi 6 and Bluetooth LE in larger appliances and using Bluetooth LE alone in lightweight devices, manufacturers can optimize for both performance and power efficiency across their smart home product portfolios.

1. Seamless device commissioning

Bluetooth LE is commonly used for the initial setup and pairing of appliances via a smartphone. Once paired, the appliance connects to Wi-Fi for ongoing communication.

This approach provides a smooth, user-friendly onboarding experience—the user simply follows guided steps in the app while staying connected to the device over Bluetooth LE. It's no surprise that the Matter protocol also recommends this method for device onboarding.

2. Standalone Bluetooth commissioning and control

Designed for low power consumption, Bluetooth LE is ideal for local control and secure, energy-efficient onboarding. It enables reliable communication between mobile devices and appliances without draining battery life.

With newer versions like Bluetooth 6.0, Bluetooth LE gets even better with updates that include:

- Improved coexistence with Wi-Fi
- Advanced low-power modes
- Higher data throughput
- Stronger security
- Optimized performance for IoT and smart home devices

Together, these features make Bluetooth LE a key enabler of responsive, efficient, and secure smart appliance experiences.

3. Bluetooth Channel Sounding for localized control

Let's imagine this scenario in which a consumer purchases a Bluetooth LE-enabled coffee maker. They're not tech-savvy and struggles with pairing the devices or following app instructions. When they open the coffee maker's companion app, the app uses Bluetooth channel sounding to verify proximity, then prompts: "We've detected a coffee maker nearby. Would you like to connect?" The coffee maker uses channel sounding to detect the closest Bluetooth LE-enabled device (like their smartphone) and just simplified the pairing process.

Instead of needing to scroll through a list of nearby devices, the coffee maker automatically detects their phone as the most likely candidate because it's physically the closest (e.g., within 30 cm). Once connected, the coffee maker can detect their location relative to the phone and continue prompting while they complete the setup.

Interoperability and Ecosystem Integration

Matter Protocol for seamless interoperability

Wi-Fi and Bluetooth LE are the cornerstone wireless protocols of the appliances market. The next step is the Matter application layer that brings these wireless standards together. Supporting both Wi-Fi and Bluetooth LE on the same chip also future proofs device makers to support Matter. Matter is a unifying smart home protocol that ensures interoperability across devices from different manufacturers. By adopting Matter, appliances can seamlessly integrate into diverse smart home ecosystems, be controlled across the ecosystem boundaries, enhancing user experience and compatibility.

Matter is built on Internet Protocol (IP), allowing smart appliances to communicate securely over Wi-Fi and Thread networks. It supports multi-admin control, enabling users to operate appliances across different ecosystems (e.g., Apple HomeKit, Google Home, Amazon Alexa). A user could buy any Matter certified appliance and add it in to their ecosystem after pairing the device over Bluetooth LE. The device can then be controlled by a Matter controller over Wi-Fi. Matter over Wi-Fi is becoming a sought-after feature. With Matter 1.2 including support for laundry washers, Matter 1.3 completes the pairing with the addition of support for laundry dryers. Users can set the dryer mode and target temperature and depending on local safety regulations, remotely start and stop the dryer. Notifications like “end of cycle” and alarms on error states can be broadcasted by the dryer over Wi-Fi and an alert can play on a Matter supported speaker.

Silicon Labs plays a pivotal role in the development and advancement of the Matter specification under the Connectivity Standards Alliance (CSA). As a founding member of the Matter Working Group, Silicon Labs has been instrumental in shaping the standard, contributing significantly to its open-source codebase. Not only is the technical framework of Matter supported but our portfolio is tailor made to accelerate Matter across the smart home industry. For appliance manufacturers, this means faster time-to-market, simplified development, reduced support burden, and enhanced consumer trust through guaranteed compatibility and security. SiWx917 is an excellent fit for Matter-enabled appliances because it combines ultra-low-power Wi-Fi 6 connectivity — critical for energy-efficient operation — with Bluetooth LE for easy device onboarding. Its integrated Matter stack support gives developers access to ready-to-go Matter software stacks, significantly reducing the complexity of Matter implementation. Silicon Labs partners with Kudelski Security to provide custom provisioning services, ensuring devices meet Matter’s security requirements at scale. CPMS (Custom Part Manufacturing Service) allows secure injection of cryptographic keys and certificates during manufacturing, helping streamline the security compliance aspect of Matter certification.

The SiWx917 is engineered to specifically support Matter over Wi-Fi. The flash and PSRAM memory configurations are designed to accommodate the demands of Matter applications, including OTA updates and secure connectivity features. For instance, the SiWx917-RB4342A development board comes equipped with 8 MB of flash and 8 MB of external PSRAM, providing ample resources for Matter over Wi-Fi development and prototyping. The SiWx917’s flexible memory architecture ensures that developers can tailor their designs to meet specific application requirements, whether operating in standalone SoC mode or as a co-processor in NCP/RCP configurations. This adaptability makes the SiWx917 a suitable choice for complex smart appliances

Open Source Development

Zephyr RTOS support

Silicon Labs' integration of the Zephyr Real-Time Operating System (RTOS) with the SiWx917 offers a robust, open-source platform for developing ultra-low-power, Wi-Fi 6 and Bluetooth LE IoT devices. As a Silver member of the Zephyr Project since 2021, Silicon Labs has actively contributed to expanding Zephyr support across its wireless solutions, including the SiWx917.

The SiWx917's architecture, featuring an ARM Cortex-M4 application processor and a dedicated network wireless processor, is well-suited for Zephyr's modular design. This dual-core setup allows for efficient separation of application and networking tasks, optimizing performance and power consumption. Developers can leverage Zephyr's extensive ecosystem, benefiting from its permissive Apache 2.0 license, which facilitates customization and integration of additional features

For hardware development, see the SiWx917 radio boards supported within the Zephyr Project, enabling developers to prototype and test applications effectively. Silicon Labs' commitment to upstream-first development ensures that enhancements and fixes are contributed back to the Zephyr community, promoting a collaborative and evolving platform for IoT innovation. The SiWx917 and Zephyr RTOS provides developers with a powerful, energy-efficient, and flexible foundation for creating next-generation IoT devices that require reliable wireless connectivity and long battery life.

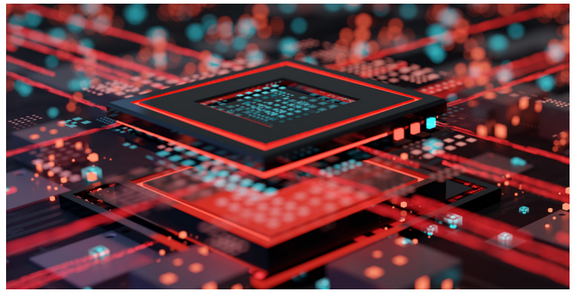
AI/ML for Predictive Maintenance

Artificial Intelligence (AI) and Machine Learning (ML) technologies play a crucial role in predictive maintenance by analyzing appliance usage patterns, identifying anomalies, and forecasting potential failures. This data-driven approach enables manufacturers to offer proactive support, reduce warranty costs, and enhance product reliability.

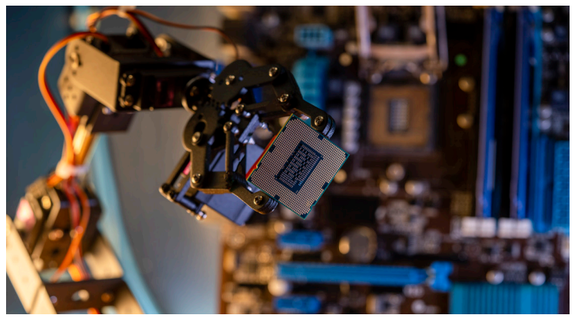
Predictive maintenance models can leverage cloud-based analytics and edge AI to process data locally on the appliance, reducing latency and bandwidth usage. AI-capable sensors can detect motor vibrations, temperature and energy consumption. The ML models analyze the historical and real-time data to identify patterns. If any anomalies are detected, alerts are sent to notify the user.

We are now seeing a trend where AI/ML is moving to the edge. These capabilities are integrated into the chip by incorporating an AI/ML accelerator that is a dedicated processor for AI/ML inference.

Efficient operation - Addition of these accelerators enable simultaneous task execution, resulting in higher throughput and faster response times for real-time applications. They handle these computations more efficiently than general purpose processors. This leads to faster processing and minimal latency delays. This is beneficial especially in video streaming to perform image processing.

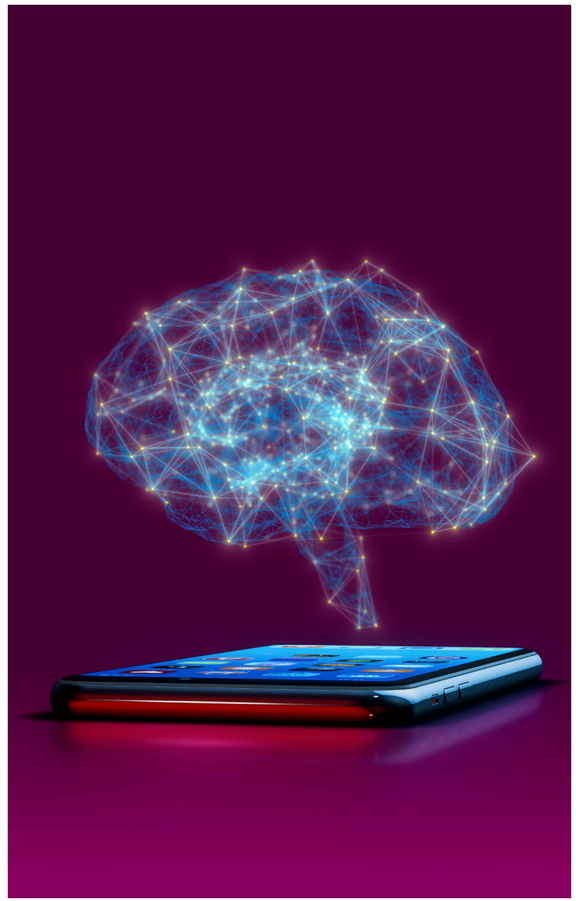


Low power consumption - By offloading the AI/ML tasks to the AI/ML accelerator, the main processor remains free, saving energy. This is critical for battery powered devices extending their longevity.



Resource optimization - By offloading intensive computations to the AI/ML accelerator, the main CPU is freed to handle other tasks. This division of work allows for simultaneous processing, enhancing the overall efficiency and responsiveness of the system. Such an approach is particularly beneficial in embedded systems where computational resources are limited. For instance, Silicon Labs' integration of AI/ML accelerator into their microcontrollers has demonstrated up to 8x faster inference speeds and up to 6x lower power consumption on EFR32BG24 compared to traditional Cortex-M processors. (Reference this article - CMP103 Edge Intelligence: How to Leverage Silicon Labs AI/ML to Improve Efficiency and Performance)

Reduced latency - By performing operations at the edge, the need to transmit data to the cloud is eliminated. Real time decision making is now moved to where the data is collected. This also allows for nodes to operate autonomously and make decisions even when network is unavailable.



Silicon Labs Solutions for Smart Appliances

Silicon Labs SiWx917 for Smart Appliances and Whitegoods

The Silicon Labs SiWx917 is designed to meet the high-performance demands of smart appliances and whitegoods. It offers robust connectivity, low power consumption, and advanced security features, making it an ideal solution for manufacturers looking to enhance their products.

Dual-processor architecture

The SiWx917 integrates an ARM Cortex-M4 processor (180 MHz) for the application, alongside a 160 MHz dedicated Network Wireless Processor (NWP) for wireless protocol stack execution (Wi-Fi, Bluetooth LE), networking stack execution, and security engine processing. Both processors operate on independent clock and power domains.

The advantage of this dual processor architecture is that the tasks are isolated. The application performance and wireless stack execution occurs concurrently eliminating the need for an external MCU. This reduces system BOM complexity, power consumption and saves costs.

Efficient power states

The SiWx917 Wi-Fi 6 wireless MCU chip supports multi-level power states (PS0 – PS4). It supports deep sleep current as low as 3.7 µA, active mode down to 32–50 µA/MHz, and Wi-Fi standby associated current of just 65 µA @ DTIM10 intervals. The SoC supports the following.

Dynamic voltage and frequency scaling

allows adjusting the clock frequency of the SiWx917 processor and other blocks on the chip to balance between power consumption and performance for the application – for instance, using a high-performance mode when executing computationally intensive tasks and switching to a power-save mode during idle periods to conserve energy.

Power domains

These strategies are employed per system block within the chip. This helps turning off the unused blocks in the chip when not needed. As an example, a battery powered appliance could enter an ultra-low power mode. The Ultra-Low-Power peripherals (ULP) are operational while the Cortex-M4 core is shut down. The Cortex-M4 can be woken up when an interrupt is triggered (e.g button press to preheat an oven).

These features collectively allow embedded systems to scale performance vs power dynamically enabling multi-year battery life and lower appliance standby current consumption.

Root of trust hardware security

Security is very important for us at Silicon Labs. The SiWx917 supports PUF-based Root-of-Trust, Secure Boot, anti-rollback firmware protection, encrypted XIP (AES-CTR/XTS), and runtime attestation. It also includes hardware cryptographic accelerators (AES-128/256, SHA-256/512, RSA, ECC, ChaCha-Poly, HMAC).

These features provide a secure software and manufacturing chain, enabling secure key provisioning, firmware IP protection. OTA firmware updates are cryptographically verified, mitigating the risk of remote hijacking.

Fully-integrated dual-radio Wi-Fi 6 and Bluetooth LE 5.4

On the Wi-Fi side, the SiWx917 supports 2.4 GHz Wi-Fi 6 (802.11ax) with OFDMA, TWT, and MU-MIMO. There is an integrated PA/LNA, RF Switch and Coexistence manager enabling a single antenna design. In this way, in congested environments, the SiWx917 offers a high throughput, low-latency networking in busy 2.4GHz environments along with Bluetooth LE supporting low power and easy onboarding. Hardware coexistence guarantees smooth and seamless multi-radio operation critical in appliances.

Large memory

The SiWx917 supports up to 672 KB shared SRAM, Flash up to 8 MB (in-package), or Optional External Flash up to 16 MB and PSRAM up to 8 MB (in-package), Optional External PSRAM up to 16 MB. The optional PSRAM/Flash provide flexibility to customers who have memory intensive applications. The architecture allows flexible memory partitioning between M4 and NWP while enabling encrypted Execute-in-Place (XiP) from flash or PSRAM.

The encrypted XiP reduces RAM footprint while enhancing code execution security. The SiWx917 can execute directly from encrypted flash and the data is decrypted on the fly by the hardware accelerated AES engine. This reduces the requirement for additional SRAM while maintaining secure applications.

Integrated AI/ML accelerator for low-power AI operations

The AI/ML accelerator on the SiWx917 offloads data processing to execute AI/ML operations freeing up the main processor to remain idle to save power or execute other operations. AI/ML delivers 500 Mega Operations Per Second (OPS) making it roughly twice as fast as the main Cortex-M4 processor.

Rich analog and digital peripheral set for real-world applications

Peripherals include 12-bit ADC @ 2.5 Msps, DAC, 3x OpAmps, comparators, I2S, PWM, QEI, and up to 45 GPIOs with flexible pinmux. For connectivity, communication via 3x I2C, 2x UART, SPI, SDIO 2.0, and HSPI is available. All these peripherals help support sensor fusion and motor control with minimal external components.

System On Chip mode

By embedding the Wi-Fi/Bluetooth LE protocol stacks on the chip, it enables the possibility to use simpler or cost-optimized host processors. The ICs are pre-certified for Wi-Fi Alliance, Bluetooth SIG and Matter. The M4 core can manage a wide range of appliance control tasks, such as sensor data acquisition (temperature, humidity, current sensing), interface management (buttons, panels), user interaction logic (settings, modes, notifications), cloud communications (via Wi-Fi), and secure OTA firmware updates — all while maintaining real-time responsiveness. The M4 also supports advanced capabilities like lightweight AI/ML inference at the edge for predictive maintenance or anomaly detection, leveraging the SiWx917's AI/ML accelerator. With features like low-power operation, secure boot, and hardware cryptography, the M4 in SoC mode offers a robust, secure, and highly integrated solution for modern connected appliances, eliminating the need for an external host MCU in many designs.

Furthermore, the SiWx917Y Module offers several distinct advantages beyond the SiWx917 SoC, particularly in terms of integration and ease of use. One of the primary benefits is the inclusion of an integrated antenna and worldwide RF regulatory certifications, which significantly simplify the development and certification processes. This integration reduces both time and costs associated with bringing a product to market. The SiWx917Y Module is certified worldwide, with modular radio type approvals for several countries

USA: Federal Communications Commission (FCC)	**Canada:** Innovation, Science and Economic Development (ISED)	**Japan:** Ministry of Internal Affairs and Communications (MIC)
European Union: Compliance with EN standards, including EN 300 328 v2.2.2, for conformity with the Radio Equipment Directive (RED)	**United Kingdom:** UK Conformity Assessment (UKCA)	**Taiwan:** National Communications Commission (NCC)

Silicon Labs BG22/BG27 for kitchen appliances

The **Silicon Labs BG22, BG24 and BG27** are tailored for kitchen appliances, providing exceptional energy efficiency, secure communication, and seamless integration with smartphone applications. Their compact form factor and advanced connectivity capabilities make them perfect for next-generation smart appliances. The BG22, BG24 CSP, and BG27 WLCSP deliver the perfect mix of tiny size, ultra-low power, strong Bluetooth performance, secure connectivity, and cost efficiency for demanding, battery-operated consumer applications like meat thermometers and smart toothbrushes.

Extremely low power consumption

BG22, BG24, and BG27 are all designed for ultra-low energy operation, with sleep currents in the sub-microampere range. This is critical for meat probes (which need multi-day operation without recharging) and toothbrushes (requiring long battery life between charges).

Chip scale package for size constrained appliance

Wafer Level Chip-Scale Packages (WLCSP) for BG24 and BG27 provide minimal footprint, perfect for extremely tight mechanical designs like, thin embedded meat thermometers and slim, ergonomic toothbrush handles. CSPs reduce board size, allowing for more efficient layouts and smaller battery accommodation.

Security

Silicon Labs Bluetooth products are known for their highest-level security standards compliance in the IoT marketspace. Secure boot, hardware cryptography accelerators, and support for secure OTA firmware updates help protect sensitive user data, ensure software authenticity, and allow field upgrades — important even for “simple” devices like toothbrushes as privacy and security standards rise.

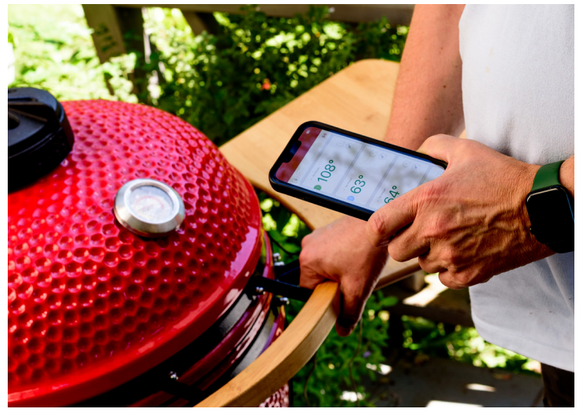
Sensor and peripheral support

BG24 and BG27 have a richer set of peripherals (I2C, ADCs, PWM, etc.) ideal for:

- Interfacing with temperature sensors or pressure sensors in thermometers.
- Running small haptic motors, sensors, and LED indicators in toothbrushes.

Bluetooth Channel Sounding

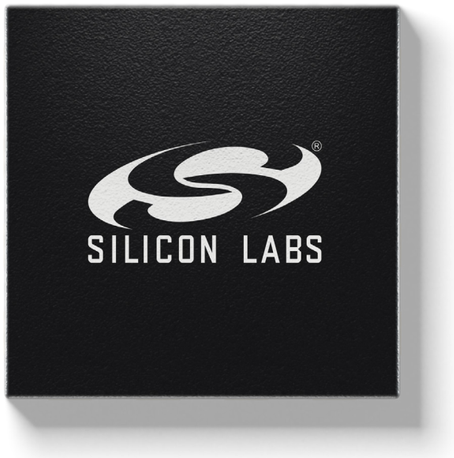
BG24 with Bluetooth Channel Sounding introduces high-precision proximity sensing to smart appliances, enabling a new generation of context-aware, personalized, and energy-efficient appliances. Using sub-meter accurate ranging, appliances can intelligently detect when a user is nearby. For example, if the user walks too far away while cooking is in progress (e.g., leaves the grill unattended), the thermometer could send proximity-triggered safety alerts or temperature alarms via Bluetooth LE. Channel Sounding also supports secure access control, ensuring that only authorized users within a defined range can interact with sensitive appliance features. Importantly, BG24 delivers this with low power consumption and cost-effective hardware, making it practical to embed into kitchen appliances without impacting battery life or BOM target.



Conclusion

The integration of Wi-Fi and Bluetooth LE into whitegoods and kitchen appliances delivers significant benefits, including remote control, automation, predictive maintenance, and energy monitoring. By leveraging these technologies, manufacturers can create smarter, more efficient, and user-friendly appliances.

Silicon Labs solutions, such as the Silicon Labs SiWx917 for smart appliances and BG22/BG27 for kitchen appliances, offer superior performance, security, and interoperability. As the smart appliance industry continues to evolve, the adoption of Wi-Fi, Bluetooth LE, and AI-driven predictive maintenance will drive innovation and enhance user experiences in connected homes.



SiWx917

Best fit for whitegoods (refrigerators, ovens, washers) that require full Wi-Fi + Bluetooth LE, Matter support, application dedicated MCU, large memory, and predictive maintenance via AI/ML.

BG24

Targeted for high-end kitchen appliances and smart sensors needing Bluetooth LE, Channel Sounding for proximity detection, and edge AI/ML capabilities.

BG22

Perfect for ultra-low-power appliances like smart toothbrushes, meat thermometers — simple Bluetooth LE connectivity.

BG27

Ideal for size-constrained ultra-low-power kitchen and personal appliance available in a WLCSP package — Bluetooth LE

	SiWx917	BG24	BG22	BG27
Wi-Fi Support	6	X	X	X
Bluetooth LE Support	5.4	6.0	5.4	5.4
Matter Support	✓	X	X	X
AI/ML Accelerator	X	✓	X	X
Channel Sounding	X	✓	X	X
MCU Integration	Dual-processor (Cortex-M4 + Network Processor)	Cortex-M33	Cortex-M33	Cortex-M33
Typical Applications	Whitegoods (Washers, Refrigerators, Ovens)	Premium small Kitchen Appliances, Coffee Maker	Toothbrushes, Meat thermometers	Ultra-low-power kitchen and personal appliance
Key Highlights	Ultra-low power, Secure OTA.	WLCSP, Secure OTA	Ultra-low power, Secure OTA	Ultra-low power, WLCSP, Battery optimized
Datasheet / Product Page	SiWx917	EFR32BG24	EFR32BG22	EFR32BG27