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Future-Proof Your SOM Implementation for Upcoming Wi-Fi and Bluetooth Generations

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KEY TAKEAWAYS

- Connected SOMs save BOM costs, shrink product size, and decrease time to market.

- The NXP and Laird Connectivity partnership provides a future-proof integrated processor and wireless solution.

- The Summit SOM 8M Plus, a family of connected SOMs developed by Laird Connectivity using NXP solutions.

- Laird Connectivity provides added security to the NXP i.MX 8M Plus processor and NXP 88W8997 Wi-Fi and Bluetooth radio.

- Laird Connectivity offers additional RF products and services.

in partnership with

Laird™
CONNECTIVITY | NXP

OVERVIEW

Particularly in industrial applications, devices utilizing Wi-Fi and Bluetooth (BT) connectivity must be refreshed multiple times throughout a product's lifecycle to meet evolving wireless connectivity standards. Device manufacturers can benefit from the planned refreshes of wireless functionality in the Summit SOM 8M Plus family.

Laird Connectivity and NXP differentiate themselves in delivering both wireless and processor solutions, allowing a seamless product roadmap. The connected Summit SOM 8M Plus, built on top of an NXP i.MX 8M Plus processor and NXP 88W8997 Wi-Fi and BT radio, future-proofs designs without sacrificing size.

CONTEXT

Dan Kephart explained the value of connected SOMs and how Summit SOM 8M Plus provides business and technical benefits. Justin Mortimer shared the specs of NXP's i.MX 8M Plus processors upon which the Summit SOM 8M Plus is built. Jay White presented on the NXP and Laird Connectivity partnership.

KEY TAKEAWAYS

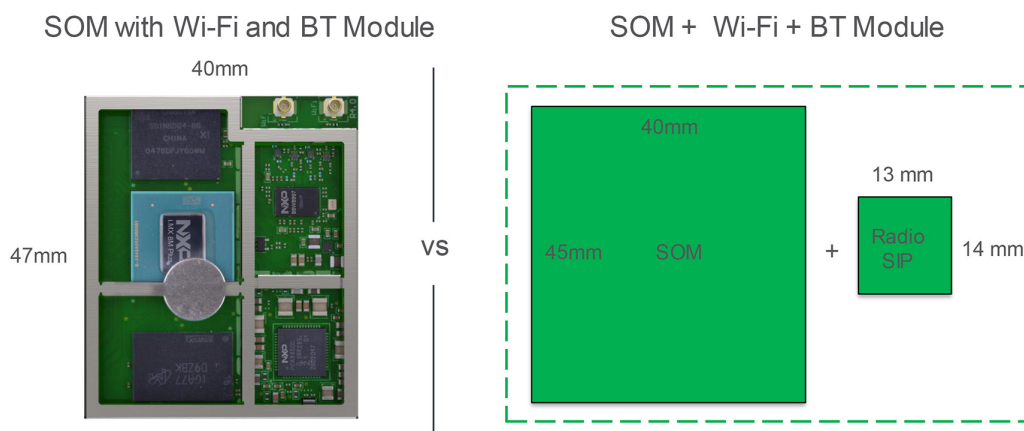### Connected SOMs decrease time to market.

In typical product design, whether a SOM or chip-down process and design, Wi-Fi and BT integration can add six or more months to the product development cycle. This time includes ensuring that host interfaces are correct and radio frequency (RF) paths are laid out correctly with no interference between the RF paths and the digital circuits.

However, a connected SOM has the hardware and software for Wi-Fi and BT already integrated and optimized for a processor's capabilities and power management. Connected SOMs from Laird Connectivity using NXP solutions are also pre-certified, supporting regulatory testing success with minimal effort.

Highly integrated, connected SOMs not only allow for better time to market by facilitating a development resource shift from embedded development to business-critical application development, but integrated SOMs also have a lower cost than a non-connected SOM and radio module and enable smaller designs.

In a design that uses a SOM without connectivity, a radio system in package (SiP) module would need to be added for Wi-Fi and BT capability, which would incur additional design cost. However, no additional module is required when using a connected SOM.

Figure 1: Connected SOMs allow for smaller designs

SOM with Wi-Fi and BT Module

40mm

47mm

VS

SOM + Wi-Fi + BT Module

40mm

13 mm

45mm   SOM

+

Radio SiP

14 mm

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The NXP and Laird Connectivity partnership provides future-proof integrations.

The nature of the sales and product lifecycles for connected SOMs—particularly in the industrial and medical spaces, where products will last through multiple generations of Wi-Fi and BT technology—often requires connected SOM vendors to undertake a mainboard redesign to accommodate new connectivity modules. This leads to increased cost in the design and development process and potential larger footprint requirements.

In some cases, the M.2 standard edge connector can be used to connect to the SOM, allowing for less costly updates through simple module replacement while maintaining design size. However, while this is appropriate for smaller volume opportunities or non-compact devices, for more compact or highly cost-effective designs, the M.2 standard workaround is not an ideal solution.
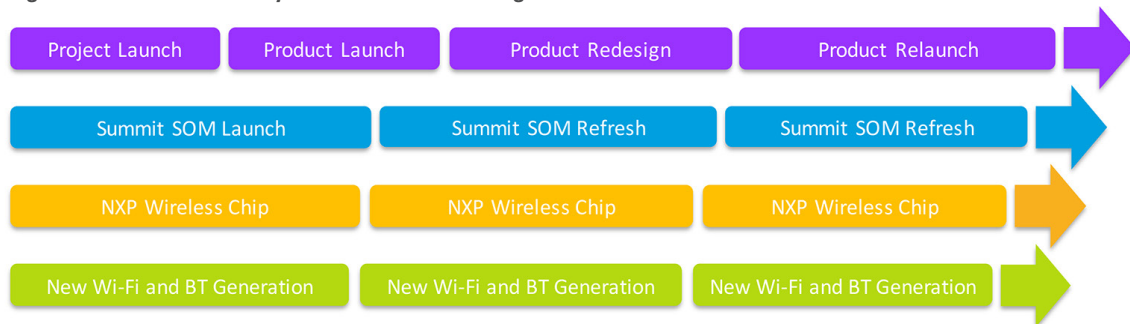
Laird Connectivity developed connected SOMs that use NXP processors and wireless that proactively refreshes. NXP develops wireless chips that support new generations of Wi-Fi/BT technology as they are released. Laird Connectivity uses its wireless expertise to create a drop-in, pin, electrical, footprint, and mechanical-compatible SOMs that uses the new NXP wireless solutions supporting the new Wi-Fi and BT standards. The Laird Connectivity connected SOMs use the appropriate NXP wireless chipset family member to match the performance of the specific i.MX processor.

> Connectivity is in our name. That's a core competency of ours.
>
> *Dan Kephart, Laird Connectivity*

The release of the refreshed connected SOMs is timed to align with NXP wireless chip launches. While refreshed connected SOMs are released under new part numbers, a refresh is not required for customers. Laird Connectivity will continue to ship and support existing part numbers using older Wi-Fi and BT standards.

Figure 2: Laird Connectivity connected SOMs using NXP solutions are refreshed with new Wi-Fi and BT standards

Project Launch	Product Launch	Product Redesign	Product Relaunch
Summit SOM Launch		Summit SOM Refresh	Summit SOM Refresh
NXP Wireless Chip		NXP Wireless Chip	NXP Wireless Chip
New Wi-Fi and BT Generation		New Wi-Fi and BT Generation	New Wi-Fi and BT Generation

The Summit SOM 8M Plus is a family of connected SOMs developed by Laird Connectivity using NXP chip solutions.

The NXP i.MX 8M Plus family of processors is based on ARM® Cortex®-A53 and Cortex-M7 cores and delivers a new level of machine learning and machine vision, advanced multimedia, industrial networking, and high reliability. The i.MX 8M Plus is ideal for smart buildings, factories, and medical/healthcare applications.

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Figure 3: The i.MX 8M Plus family of processors is built for industrial and medical applications

Healthcare	Human machine interface	Machine vision & learning	Industrial control & network
Patient monitors, infusion systems, ultrasound	Industrial HMI, building control panel	Scanner, service robot	Factory robot, motion control
Nurse call systems, bed systems	Kiosk, two-way radio, fitness equipment	Room monitor, industrial printer	Building control, gateway
Test equipment, surgical equipment	Industrial vehicle display	Machine vision	Process manager, solar inverter boost

Longevity	Extreme Operating Conditions	Security	Safety and Reliability	Scalable Solutions

> We saw a great opportunity in the market, in developing the 8M Plus, to bring a whole new range of processing capability to the edge.
>
> *Justin Mortimer, NXP*

Laird Connectivity brings a unique set of capabilities into the NXP partner ecosystem.

- The first family of SOMs developed through the partnership—the Summit SOM 8M Plus—is an applications processor and memory subsystem based on the i.MX 8M Plus processor, along with its companion PCA9450CHN PMIC, LPDDR4 DRAM, and 5.1 eMMC flash.

- All pins on the i.MX 8M Plus processor that are not used by the memory, wireless, and PMICs are available for use by the customer.

- Multiple memory configurations, including 2GB DRAM/16GB eMMC, 1GB DRAM/8GB eMMC, and 512MB DRAM/8GB eMMC, are available as standard part numbers; however, larger memory configurations can be provided upon request, 8GB DRAM/64 GB eMMC.

Measuring 40 x 47 x 4.6mm, the Summit SOM 8M Plus connected SOMs have an industrial temperature range of -30° C to +85° C. The compact Wi-Fi 5 and BT 5.3 subsystem is based on the 88W8997 Wi-Fi and BT chip and companion PM823UK PMIC, with two u.FL antenna ports. The radio design has full hardware LTE coexistence filtering, allowing seamless interaction with an LTE module next to the SOMs.

The SOMs are software configurable to accommodate different characteristic preferences, such as a 2x2 or 1x1 Wi Fi configuration or PCIe or SDIO host interfaces, and is certified with FCC, IC, CE, MIC, RCM, and Bluetooth SIG certifications.

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| Details of the Summit SOM 8M Plus |
| --- |
| Software-configurable antenna configuration
– 2x2 MIMO Wi-Fi for performance
– 1x1 SISO Wi-Fi for power efficiency |
| Software configuration processor to Wi-Fi host interface
– PCIe for high performance and low latency
– SDIO for power efficiency |
| Full hardware LTE coexistence filtering onboard for seamless, no-compromise operation of LTE with Wi-Fi and BT |
| Intelligent and configurable Wi-Fi scan and roaming algorithms |
| WPA3-Enterprise including the most secure CNSA 192-bit mode, WPA3-Personal, WPA2-Enterprise, WPA2-Personal |
| TLS 1.3 support for EAP-TLS and EAP-TTLS |
| Automatic selection of regulatory domain via Adaptive World Mode
– Ship 1 SKU worldwide and leverage a fully optimized channel and power set for each country
– Dozens of regulatory domains supported |

The unique partnership between Laird Connectivity and NXP is built on Laird Connectivity's strong foundation of standalone products and services. Together, NXP and Laird Connectivity offer the perfect combination of i.MX 8M Plus processing and Wi-Fi 5 + BT 5.3 wireless for next-generation connected product designs. The available development kit provides reference designs, including power consumption measurements, battery management, cameras, audio, PoE, and LTE+GPS.

> One of the things that makes Laird Connectivity unique is their connectivity expertise within the industry. They bring along a set of engineering skills, both from a hardware and software perspective, that really elevates their level and quality of offerings.

Jay White, NXP

Figure 4: The Summit SOM 8M Plus Development Kit
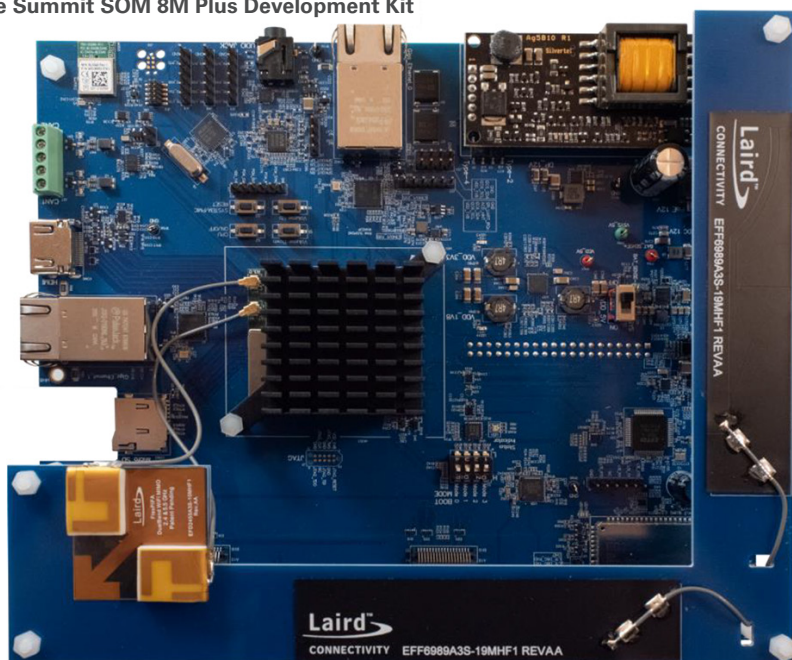
Laird Connectivity provides added security to the i.MX 8M Plus processor.

Laird Connectivity has used its expertise and experience to develop the Summit Suite Chain of Trust. This full, top-to-bottom secure device encrypted solution leverages the secure and encrypted hardware root-of-trust boot architecture and security storage in the i.MX 8M Plus and includes secure key programming for customers at manufacturing time, a secure signing service for customer-generated images, and a secure enclave on module architecture using TrustZone. This secure enclave on module architecture allows for a secure element functionality that runs at the speed of the processor and for direct Linux access through APIs.

The Summit Suite Software Vulnerability Monitoring and Remediation provides long-term support for Yocto Linux and Zephyr board support packages. Laird Connectivity also offers long-term common vulnerabilities and exposures (CVE) monitoring and remediation of both Yocto Linux and Zephyr software bill of materials, including reporting through a web user interface.

For applications requiring FIPS 140-3 level security, such as U.S. federal or medical installations, validation will be finalized and made available in late 2023 or early 2024. FIPS 140-3 level validation will apply to data in transit over Wi-Fi and data in transit over any interface via TLS, using TLS APIs to perform TLS encapsulation. The same cryptographic module that is validated for data in transit is also validated to for the encrypted file system for data at rest.

Laird Connectivity offers additional RF products and services.

Laird Connectivity excels at RF design and testing. Each of Laird Connectivity's modules or SOMs has multiple corresponding optimized radio antennas. For example, the FlexMIMO antenna enables capabilities such as multiple-input/ multiple-output (MIMO) within a single antenna platform. In addition to products, Laird Connectivity offers custom antenna design, 3D antenna modeling and scanning services, and is a full-compliance solutions partner, offering on-site regulatory compliance testing.

ADDITIONAL INFORMATION

Summit SOM 8M Plus. For more information and full documentation, visit
www.lairdconnect.com/summit-som-8m-plus

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BIOGRAPHIES

Dan Kephart
Senior Product Manager, Laird Connectivity

Dan Kephart is the senior product manager of IoT platforms at Laird Connectivity, which provides a full range of modules, internal antennas, and IoT devices that simplify the process of using wireless technology. In this role at the company he oversees development of solutions utilizing multiple wireless technologies including Wi-Fi, Bluetooth, and cellular. He has 15 years of experience in the engineering and wireless design industry, and he earned his degree in computer engineering from the University of Akron.

Justin Mortimer
Global Marketing Director, Edge Processing Business, NXP

As global marketing director at NXP, Justin Mortimer leads a technical marketing organization within NXP's industrial edge business where he and his team bring NXP's latest MCU/DSCs, i.MX RT Crossover MCUs, and processors to the worldwide market. In addition to working with NXP's distributors and partners, Justin has the unique opportunity of collaborating with the broad base of global customers as they leverage NXP's portfolio of products, software, and solutions. Prior to NXP, Justin earned a Bachelor of Science in physics from the University of Minnesota, where he graduated with academic honors while swimming as an NCAA Division I collegiate athlete.

Jay White
Senior Marketing Manager, NXP

Jay White is a senior marketing manager for mass market at NXP Semiconductors. He is a Wi-Fi industry expert with over 15 years of experience. He has a passion for improving day-to-day mobility through the use of Wi-Fi connectivity and holds a vice chair position with the Wi-Fi Alliance's Healthcare Marketing Task Group.

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