

FASTER, SIMPLER, AND MORE SECURE:

How a System-on-Module
Design Strategy Can Produce
Faster, Simpler Design Cycles

By Dan Kephart,
Senior Product Manager at Laird Connectivity

Reducing Complexity: The SOM Approach

The pressure increases every year on design teams to get to market faster the wirelessly-connected products in their development pipeline. Their companies are looking to outpace their competitors, which in turn is forcing design processes to be shorter and shorter. In addition to the pressure to be faster, there is also pressure on design teams to deliver more features, more security, more everything. Those overwhelming pressures often make it impractical to employ a from-scratch, chip-down engineering strategy for entire projects, which is too slow, too costly and too risky. That is why so many engineering teams have used wireless modules and modems to eliminate the need to design the wireless connectivity into products from scratch. These pre-designed, pre-certified modules and modems eliminate the need to do the complex engineering around embedded wireless hardware layout, software integration, antenna selection and placement, and more - often cutting weeks or months off of typical design timelines, while also reducing risk and enhancing performance.

Design teams have another powerful tool at their disposal that can shorten design cycles even more dramatically than the module approach discussed

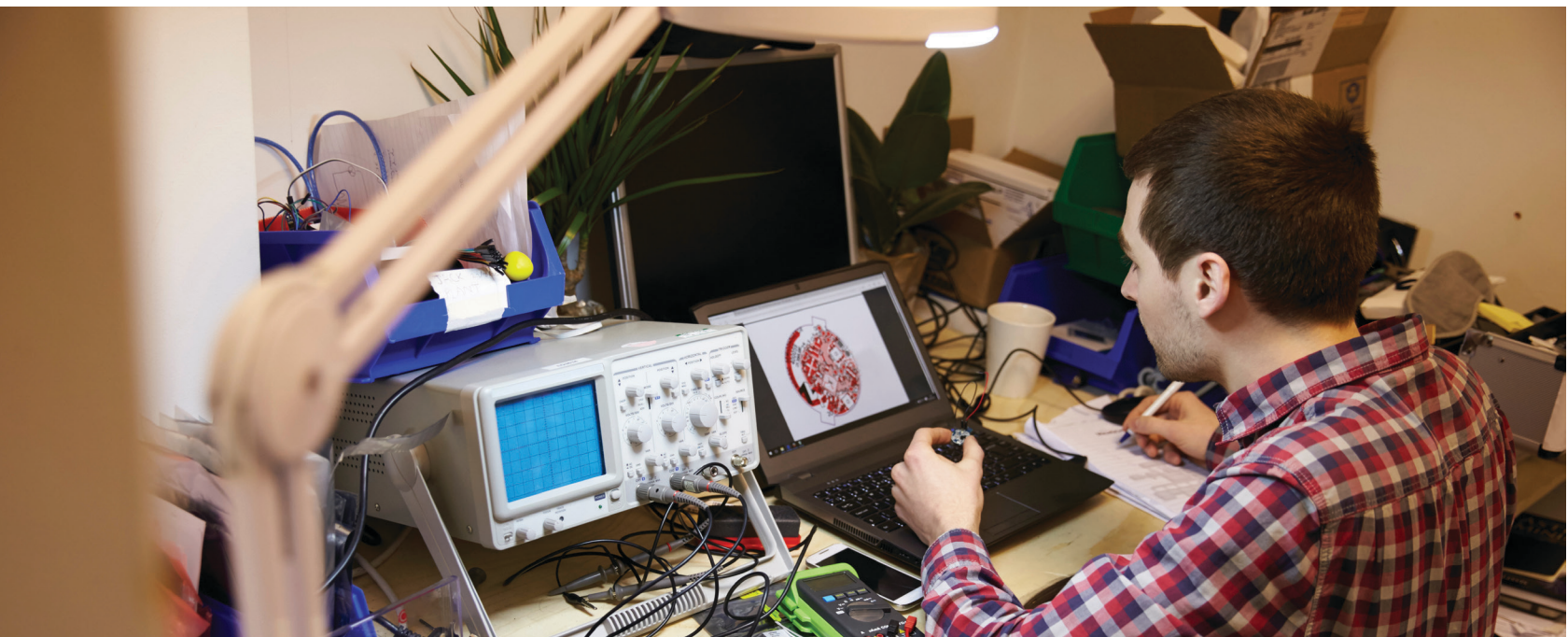
above, but it is a new strategy for most engineering teams. By using a System-on-Module (SOM) design strategy, product design timelines can be cut in significant ways beyond the efficiencies of the module strategy discussed above. Using a SOM strategy also enables design teams to quickly add functionality to products while also delivering higher security that is so critical to markets such as healthcare, finance, industrial and enterprise computing.

In the same way that utilizing a wireless module eliminates a long list of complex tasks for a smart product, a SOM strategy simplifies engineering by providing engineers with a pre-designed, pre-certified solution that integrates the wireless module, the device's main processor, high speed RAM, reliable flash memory, and power management on the same board. This eliminates a tremendous amount of from-scratch engineering work as well as the complex and time-consuming engineering tasks involved in a chip-down design, allowing design teams to leap ahead in the product development process. Using a SOM also gives design teams the ability to quickly incorporate advanced functionality and more stringent security into products without the complex work that would be required to accomplish those with a chip-down approach.

This acceleration and simplification of a wirelessly enabled design is valuable for every engineering

department, but particularly for those with a small staff and limited resources. A SOM strategy allows these smaller design teams to keep pace with intimidating project pipelines and aggressive timelines. Laird Connectivity's newest SOM solution, the Summit SOM 8M Plus, can serve as the centerpiece of their system-on-module design strategy for a broad range of advanced IoT applications, including industrial IoT rugged handheld devices, industrial IoT gateways, IoT vision solutions, and healthcare devices.

This white paper provides details about the Summit SOM 8M Plus and discusses how design teams can take advantage of its capabilities to develop wireless enabled products faster, easier and with more security. Along the way, we'll also share best practices and important design considerations that will help your engineering team be successful with your first SOM design projects.



About the Summit SOM 8M Plus

The Summit SOM 8M Plus is a highly-integrated and comprehensive hardware and software solution that combines NXP's multi-core applications processing with NXP dual-band 2x2 Wi-Fi 5 and Bluetooth 5.3 connectivity. Laird Connectivity's family of embedded SOM solutions accelerate your product development cycles by giving design teams a secure, smart, connected IoT platform for deployment in the most demanding applications. Built on the latest processors and NXP wireless, and utilizing our long term software support, Laird Connectivity's SOM solutions are secure to deploy, scalable, and built to last.

The Summit SOM 8M Plus is Laird Connectivity's most versatile, feature-rich, and secure SOM to date. Powered by NXP's i.MX 8M Plus applications processor and 88W8997 wireless SoC, the Summit SOM 8M Plus delivers a versatile, power efficient quad-core Arm® Cortex®-A53 MPU and Cortex-M7 MCU solution for powerful heterogenous multiprocessing. Incorporating the i.MX 8M Plus SoC into the Summit SOM 8M Plus allows customers to leverage hardware acceleration for machine learning with an integrated 2.3 TOPS neural processing unit, rich multimedia (graphics, video, vision, and audio) with a DSP core and GPU, advanced connectivity, and enhanced security for high performance, flexible solutions.

Security and longevity are core pillars of the Summit SOM 8M Plus. It is designed from the ground up with a powerful, comprehensive security architecture, ideal for today's connected IoT applications. Secure

enclave and secure boot powered by the i.MX 8M Plus enables root of trust hardware-based software validation and a high-performance and a flexible secure storage system for passwords, certificates, and data storage, with an upcoming Summit Linux FIPS Core Crypto (FIPS 140-3 Level 1) validation. It supports the latest WPA3-Personal, WPA3-Enterprise, and WPA3-Enterprise SuiteB 192-bit Wi-Fi security standards and the upcoming FIPS 140-3 certification will include Wi-Fi data-in-transit. It will be globally certified to reduce customers' barrier to entry. Regulatory certifications will include FCC, IC, CE, RCM, MIC, and Bluetooth SIG approvals.

Its comprehensive array of interfaces includes support for up to three displays and several options for video out, camera, audio, and I/O. The onboard Cortex-A53 and Cortex-M7 cores allow simultaneous Linux® and RTOS execution on dedicated, firewalled subsystems. The quad-core Cortex-A53 on the i.MX 8M Plus SoC is powerful enough to run multiple instances of Linux for various purposes, such as user interface, connectivity, and more. Additionally, pin-compatible connectivity refreshed Summit SOM 8M Plus modules will be available in the future as NXP updates their 2x2 Wi-Fi +Bluetooth combo silicon to the latest standards such as tri-band Wi-Fi 6E and full featured Bluetooth 5.3.

Laird Connectivity's dedication to long term support is reflected in their



collaboration with NXP, as well as Laird Connectivity's software offerings and product longevity roadmap. Laird Connectivity's upcoming device management solution allows devices to be updated in the field, empowering end customers to stay ahead of CVEs, feature updates, and other critical software patches. Laird Connectivity's long-term support (LTS) Summit Yocto Linux and Summit Zephyr RTOS releases provide long term CVE remediated software support. Summit SOM 8M Plus also supports NXP's base Yocto Linux and FreeRTOS release options. Additionally, the i.MX 8M Plus processor is backed by NXP's Product Longevity Program, which ensures long-term availability of 15-plus years.

Based on decades of embedded device and wireless connectivity expertise, our SOMs are well supported with advanced development kits, documentation, software, firmware and dedicated FAE support teams – all readily available to help speed development. The Summit SOM 8M Plus evaluation kit includes reference designs for display, camera, audio, LTE, GPS, power consumption profiling, PoE, battery usage, battery charging, USB 3.0 power, and more.

Laird Connectivity's family of embedded SOM solutions accelerate your product development cycles by giving design teams a secure, smart, connected IoT platform for deployment in the most demanding applications.

Designing with Summit SOM 8M Plus

Following are three key advantages that a SOM design strategy using the Summit SOM 8M Plus has over traditional chip-down design:

Faster Development Through a Single, Integrated Board

The Summit SOM 8M Plus makes product development far faster than a chip-design approach in a number of ways. One of the most significant ways is that its single-board design eliminates the complex engineering processes of integrating the two key elements of a wireless device: the central processing unit with its associated memories and power management that supports the application and the wireless module that enables connectivity. Laird Connectivity has eliminated that laborious process with a SOM solution that combines both on a single, integrated board that is powered by proven NXP technology. The pre-designed integrated board features NXP's i.MX 8M Plus applications processor, the 88W8997 wireless SoC, LPDDR4, eMMC 5.0 HS400, and PMICs in a configuration that will support a broad range of use cases.

The integrated solution eliminates a significant amount of design work while also delivering features that would be complex to achieve with in-house engineering resources, including enhanced security, rich multimedia, enhanced connectivity, machine learning and more.

Just as importantly, the Summit SOM 8M Plus has numerous development kit reference designs for many of the applications that design teams will work on. These are invaluable resources for jump-starting projects in ways that significantly accelerate the design process and ensure success of the product. Laird Connectivity prides itself on providing a wealth of dev kits, other resources, and technical support

for design teams that enables them to move forward quickly and successfully on projects.

Advanced Security You Don't Have to Build Yourself

Regardless of whether the design project is an industrial sensor, a Bluetooth-enabled pair of headphones or a medical device, engineering teams are being asked to deliver higher levels of security in wireless devices. The pressure to make IoT secure has long been a reality in regulated industries with security mandates like healthcare, but now it is equally true for devices implemented in other industries such as industrial and enterprise. And it's also increasingly true for consumer devices, where security is a key part of the brand promise to customers by consumer brands.

This places a major burden on engineering teams who must build more security features into IT devices while still adhering to aggressive product delivery timelines. Building out these security elements can require months for a chip-down design approach because of how much of the work is time-consumingly done by hand. It is slow, expensive and risky. The Summit SOM 8M Plus provides extensive built-in security, including Secure Boot, which is cryptographically verified for all boot stages, ensures image integrity and provides protection against rollback attacks.

This SOM solution also provides an on-module secure enclave in the form of a runtime-isolated processing domain via ARM TrustZone combined with NXP's Cryptographic Acceleration and Assurance Module for secure processing that will also be included in the upcoming FIPS validation. Further resource partitioning techniques enables engineers to design in more secure ways as well as employ virtualization within the device (which is discussed in more detail below). The Summit's secure architecture also provides secure data storage for Linux and enhanced Wi-Fi Connectivity Security, which are critical protections for a wide range of use cases.



Building out security capabilities like this using a chip-down design using only the silicon vendor's board support package is one of the biggest obstacles to rapid product development timelines. The Summit SOM 8M Plus provides them out of the box, enabling engineers to complete a critical checklist of security needs instantly.

Resource Partitioning and Virtualization for Security

As discussed above, the Summit SOM 8M Plus gives engineers the power to do resource partitioning within a device, which gives designers the ability to build layers of protection within the overall design. The first form of this is the ability to run a Linux OS on the Cortex-A53 processor and a RTOS on the Cortex-M7 microcontroller simultaneously. This allows the most critical functions to run in real-time on the microcontroller without being interfered by user interruptible processing priorities like touchscreen displays.

Virtualization can further allow for dividing the quad-core Cortex-A53 subsystem in in the i.MX 8M Plus. Virtualization is typically a design concept in the world of servers and data centers, where the computing resources within and between servers are used in highly-flexible ways to launch, support and upgrade applications. Virtualization in a server and data center allows organizations to direct computing resources exactly where it is needed, and the same is true within a wireless device. On the Summit SOM 8M Plus multiple full feature Linux OS instances can run

simultaneously to allow for different functional use cases in each firewalled Linux OS instances. For example, connectivity can be isolated to its own Linux instance while display and user input are isolated to another different Linux instance. Since connectivity exposes the system to network based attacks, virtualization allows for better firewalling of the connectivity from other device critical functions. In addition, as software ages and new network security vulnerabilities become known, often the only way they can be fully addressed is via a software update. Virtualization allows for the connectivity-centric Linux OS instance to be software updated regularly to address network based security vulnerabilities while keeping the rest of the system software the same.

For more information about the Summit SOM 8M Plus, visit: www.lairdconnect.com/summit-som-8m-plus. And for more information about the full family of SOM solutions, visit:

www.lairdconnect.com/system-on-modules



About the Author:

Dan Kephart is the Senior Product Manager of IoT Platforms at Laird Connectivity, which provides a full range of modules, 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.

About Laird Connectivity:

Laird Connectivity simplifies wireless connectivity with market-leading RF modules, internal antennas, IoT devices, and custom wireless solutions. Our products are trusted by companies around the world for their wireless performance and reliability. With best-in-class support and comprehensive product development services, we reduce your risk and improve your time-to-market. When you need unmatched wireless performance to connect your applications with security and confidence, Laird Connectivity delivers -no matter what.

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