Deep dive into the tools and development kits of the SimpleLink™ MCU platform

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Overview

Today's Internet of Things (IoT) market is more competitive than ever. End users demand more functionality and features, while expecting cost and size to decrease without any impact on battery life. Solutions are getting more complex, forcing you to become system-level experts capable of extracting the full feature set of the silicon that you choose to build your systems around.

To keep up with market needs and stay differentiated, you need to be nimble and flexible. Texas Instruments understands that you need to surround yourselves with efficient and effective hardware and software development tools. TI also understands that the IoT market is a greenfield of opportunity where key players are still being established, and being first to market with an innovative new solution can help establish your product as the leader within a space.

Starting from evaluation to prototyping to development and optimization, TI's SimpleLink™ platform offers simple yet powerful hardware and software tools that enable you to ramp up quickly based on your customer needs. With a single development environment, you only need to learn one unified, consistent development platform regardless of the SimpleLink microcontroller (MCU) you're using. You can quickly spin connected products that feature Wi-Fi®, *Bluetooth*® low energy or Sub-1 GHz radio-frequency (RF) connectivity depending on your customer's use case, get to market quickly and stay at the bleeding edge of the IoT.

Evaluation

SimpleLink MCUs | The most scalable portfolio of wired and wireless MCUs

SimpleLink MCUs give you a broad portfolio of wired and wireless low-power, ARM® Cortex®-M microcontrollers. The SimpleLink platform features:

- Low power, advanced security and best-in-class analog integration.
- Easy integration into your system, enabling faster time to market.
- Wireless MCUs to support many applications without requiring a separate host MCU.
- A host MCU that can add advanced analog capabilities, more memory or processing power with common software development kit (SDK) elements.
- An optimized host MCU for SimpleLink wireless network processors runs the connectivity stack.
- Support for wired and wireless connectivity standards, including Bluetooth low energy, Wi-Fi, Sub-1 GHz and RS485, with ZigBee®, Thread and Ethernet coming soon.

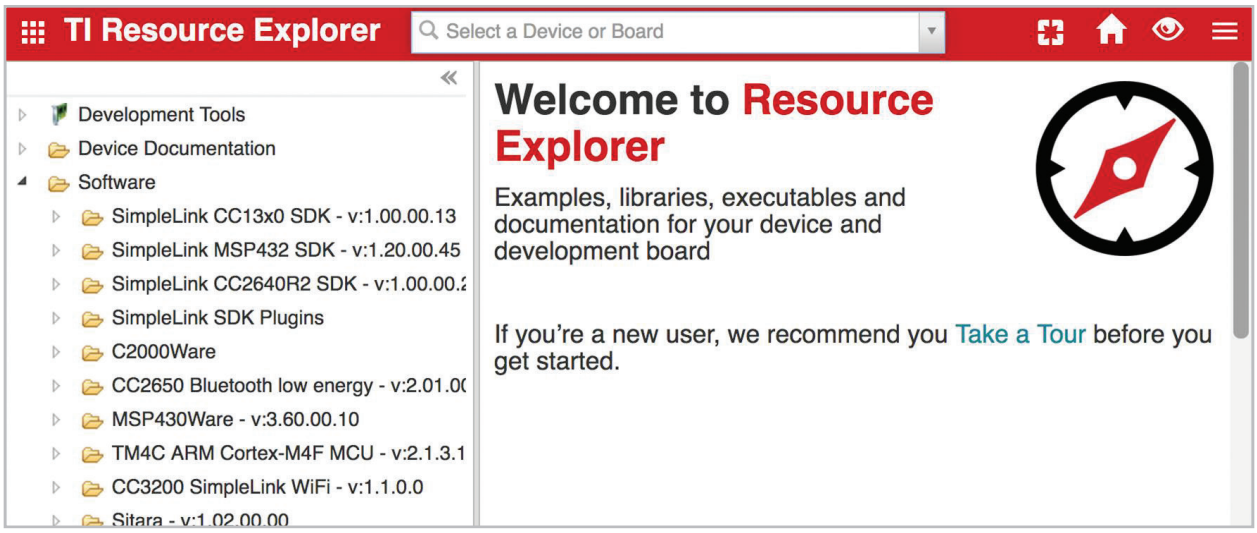


***Figure 1**. TI Resource Explorer offers all of the resources needed to develop on a SimpleLink MCU, including the SimpleLink SDK, documentation, training and more*

This scalable portfolio helps you preserve your application development as your needs evolve based on industry and customer demands. SimpleLink MCUs have 100 percent code reusability with the new TI SimpleLink SDK, so even when requirements change, moving to a new SimpleLink MCU does not mean that you have to start over.

Prototyping and Development

TI Resource Explorer | All of your development resources in one place

SimpleLink MCU devices, tools and software are easily accessible using TI Resource Explorer, a cloud-enabled repository that allows you to find the SDK, documentation, examples and more for your SimpleLink design. You can explore the SDK, interact with demos, view code examples and read documentation and application programming interface (API) guides so that you can hit the ground running when the hardware arrives.

Resource Explorer features intelligent filtering so you can quickly find content that pertains to your development goals. Resource Explorer is also integrated into the SimpleLink tool chain and allows single-click import into your integrated development environment (IDE), enabling you to launch graphical user interfaces (GUIs) and easily discover relevant code examples and resources.

SimpleLink Academy | Highly curated trainings to help you innovate

SimpleLink Academy is a collection of highly curated training material developed by TI subject-matter experts. Comprising dozens of chapters and workshops, SimpleLink Academy helps developers ramp up quickly with the SimpleLink MCU platform and SDK.

In addition to speeding up ramp-up time and helping you get started quickly, SimpleLink Academy also helps you build differentiated products with specialized trainings.

***Figure 2**. Hands-on training with SimpleLink Academy*

Code Composer Studio™ IDE | Powerful Eclipse-based IDE from TI

The Code Composer Studio IDE supports TI's entire embedded processor portfolio, including the SimpleLink MCU platform. It includes an optimizing C/C++ compiler, source-code editor, project build environment, debugger and profiler. The intuitive IDE provides a single-user interface that takes you through each step of the application development flow. Once you become familiar with this tool and interface, you can get started on new projects faster than ever before.

Code Composer Studio software combines the advantages of the Eclipse software framework with advanced embedded debugging capabilities from TI, resulting in a compelling feature-rich development environment for embedded developers using all SimpleLink devices.

CCS Cloud | Browser-based IDE to help you start developing ASAP

TI's CCS Cloud is a browser-based IDE that allows you to edit, compile and debug your code in the cloud, all without a lengthy download and install keeping you from coding. CCS Cloud offers tight integration with TI Resource Explorer, which enables you to import code examples and projects with a single click from the TI Resource Explorer repository. The simple IDE provides a C/C++ compiler, source-code editor, project build environment and debugger.

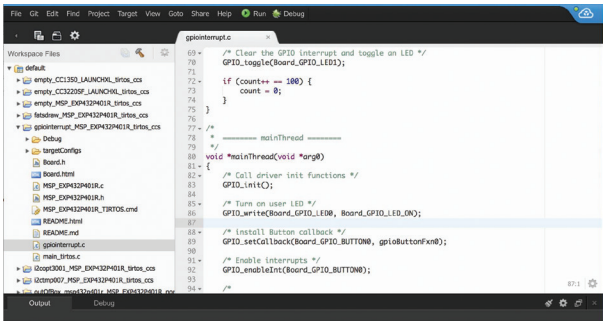


***Figure 3**. Use CCS Cloud to edit, compile and download code to your LaunchPad kit.*

Third-Party IDEs | Use tools and environments you are already familiar with

The SimpleLink platform offers support for third-party IDEs. If you're already familiar with IAR Systems Embedded Workbench® and SEGGER tools, you can continue to use these environments.

Configuration Tools and Utilities | Spend more time differentiating your application

As applications get more complex, code-generator utilities can help you focus on differentiating your application while these tools generate code for configuring pins, peripherals or radios. These various utilities include:

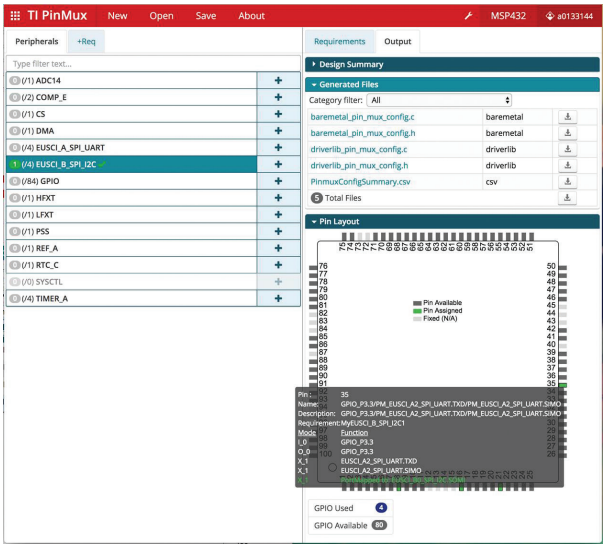


***Figure 4**. Use PinMux to configure the device peripherals and pin multiplexing options.*

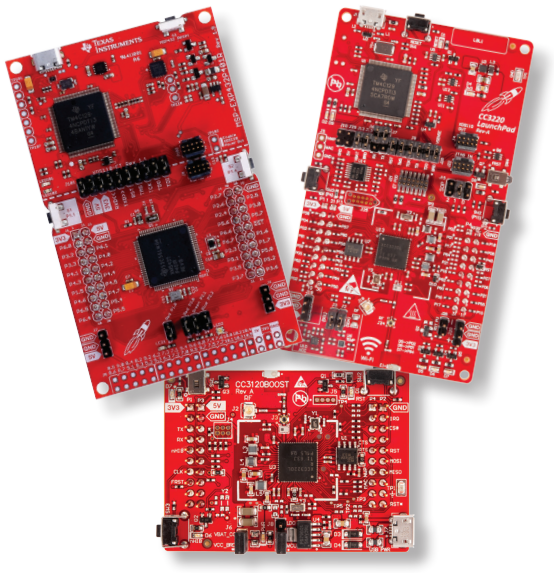
- PinMux for generating pin, peripheral and driver configuration code.
- SmartRF Studio for generating configuration register values for testing, debugging and optimizing RF systems on supported wireless SimpleLink MCUs.

- Sensor Controller Studio to generate code for the low-power, autonomous sensor controller found on the SimpleLink CC26xx and CC13xx devices that performs simple background tasks independent of the main system CPU.
- Uniflash enables you to flash your device with an image easily, without the need for a full-blown IDE. GUI and command-line interfaces are available for testing and production.
- GUI Composer is a what-you-see-is-what-you-get (WYSIWYG) utility where you can create custom PC-side GUIs that complement your application.

LaunchPad™ Development Kits | Open source, modular hardware building blocks

Starting at U.S. $12.99, TI's LaunchPad development kits are low-cost, modular, consistent and open-source hardware tools. Every SimpleLink MCU is available as a LaunchPad development kit, featuring:

- An integrated on-board emulator for programming and debugging.
- A standardized BoosterPack™ plug-in module header, allowing you to tap into the growing list of BoosterPack plug-in modules such as sensors, displays, LED drivers and more.
- An open-source hardware design that enables you to use the LaunchPad kit as a reference design for your own custom hardware.



Optimization and Debugging

XDS110 | Powerful, affordable debug probes to help you optimize towards production

Part of the newest class of debuggers from Texas Instruments, the XDS110 is a stand-alone debugger offering JTAG, cJTAG and ARM SWD support. While LaunchPad development kits do feature an on-board debugger, the XDS110 offers additional features and capabilities to allow developers to drive further optimization in their end applications.

EnergyTrace™ Technology | Energy debugging to get best-in-class power consumption.

EnergyTrace technology is an energy-based code analysis utility to help you debug your ultra-low-power applications. You can optimize your embedded application for the lowest possible power consumption to improve battery life or enable energy-harvesting applications, visualizing energy consumption and identifying power leaks. EnergyTrace technology is available on some SimpleLink LaunchPad development kits, and is also available as a modular pod that you can attach to the XDS110 stand-alone debugger.

Runtime Object Viewer | Keep an eye on your system memory and resources

As IoT systems become more complex, it is difficult to see exactly what is happening in your system at any given time. TI's runtime object viewer (ROV) enables you to see all of the threads and paths in an application program at run time without having

to halt the source. You can easily see what threads are running at any time, along with the priorities and loads for each. ROV helps prevent memory leaks or other failures that can impact your end product's operation, saving development time.

Production

TI supports customers throughout the entire development cycle and doesn't drop the ball at production. TI offers open-source software with friendly licenses, giving you a starting point for your own development. Open-source software helps customers get to market more quickly with a proven, tested software platform.

You can use TI's schematics and layouts as a starting point, cutting down significantly on design time. This can be especially important for RF developers, who can leverage TI's RF expertise and incorporate TI RF hardware design into their own products. TI also offers **pre-certified wireless modules** to help bring wireless products to market quicker, saving time and money.

The **TI Design Network** is a worldwide community of companies offering products and services that complement TI's semiconductor device solutions. Products and services include a broad range of reference designs, turnkey products and services, system modules, embedded software, engineering services, and development tools that help you accelerate development efforts and reduce time-to-market.

Conclusion

TI's new SimpleLink ecosystem offers simple yet powerful, integrated hardware and software tools to get you to market quickly. With a single development environment, you will only need to ramp up once on this unified, consistent development platform, regardless of the SimpleLink MCU you're using. As products become more and more complex, TI provides the tools you need to create complex systems efficiently, optimized for best-in-class performance and robustness.

Our unified tool suite offers a common set of hardware and software tools to support the **SimpleLink SDK**, including downloadable and cloud-based tools and training. Using TI's SimpleLink ecosystem for your next IoT design gets you to market quicker with the best possible design.

SimpleLink devices are available for purchase or sampling from **TI.com** or any of TI's distribution partners at any quantity. See **www.ti.com/simplelink** for more information.

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