Technical Article
Merging Wired and Wireless Connectivity to Build an Intelligent Gateway to the Cloud

TEXAS INSTRUMENTS

Dung Dang

Analyst firm IHS Markit predicts that by 2025, the Internet of Things (IoT) will comprise as many as 75 billion connected things. To reach this large number, manufacturers will need to merge their legacy systems (with decades-old infrastructures comprising mostly wired protocols) with always-evolving wireless connectivity standards and technologies.

Whether in a factory or building, there is potentially a massive benefit to aggregating, managing and analyzing edge-node data in the cloud. However, connecting devices with varying communication protocols together – and up into the cloud – poses one of the largest barriers to IoT network development. With an intelligent gateway (Figure 1), you can simplify end-node designs, reduce network traffic and offer faster decision-making without connecting directly to the internet.

Figure 1. The Intelligent Gateway Is a Solution to Help Manage the 75B Connected Things

Gateways offer an elegant way to simplify a sensor network by supporting the multiple ways that end nodes natively connect. Some wired end nodes might use Building Automation and Control network (BACNet), IO-Link, 4-20mA or Highway Addressable Remote Transducer (HART), depending on factory or building automation systems. Some wireless end nodes in the network might use Wi-Fi® or Thread, which natively offers an internet protocol (IP) address, while others might use non-IP-based protocols such as *Bluetooth*® low energy or various Sub-1 GHz protocols.

An intelligent gateway can mitigate the variety and diversity of devices by consolidating data from disparate sources and interfaces and bridging them to the internet. This means that the individual nodes do not need to bear the complexity or cost of a high-speed internet interface in order to connect to the cloud.

Merging Wired and Wireless Connectivity

TI is making it easier for developers to connect end nodes to the cloud by introducing Ethernet connectivity to the SimpleLink™ microcontroller (MCU) platform. SimpleLink™ MSP432E4 Ethernet MCUs with integrated Ethernet media access control (MAC) and physical layer (PHY) help you bridge from existing designs to future-proofed systems by enabling wired and wireless connectivity through a single platform.

SimpleLink MSP432E4 MCUs as shown in Figure 2 integrates a large number of wired interfaces, including industry standards like USB, Controller Area Network (CAN) and over 20 serial interfaces, to help you connect a wide variety of wired sensors and actuators to the gateway. A growing number of wireless attach options complement these interfaces, including Wi-Fi, Bluetooth low energy and Sub-1 GHz 802.15.4, by leveraging SimpleLink wireless MCUs and SimpleLink software development kit (SDK) plug-ins to add wireless connectivity to the gateway.

Equipped with a 120 MHz central processing unit (CPU) engine, 1MB of flash and 256kB of random access memory (RAM) – with the option to expand the memory via external memory interface – the MSP432E4 also provides ample processing power to help aggregate, filter and process sensor data. This enables the intelligent gateway to make smarter decisions locally, react quickly and minimize internet traffic by communicating only necessary data to the cloud.
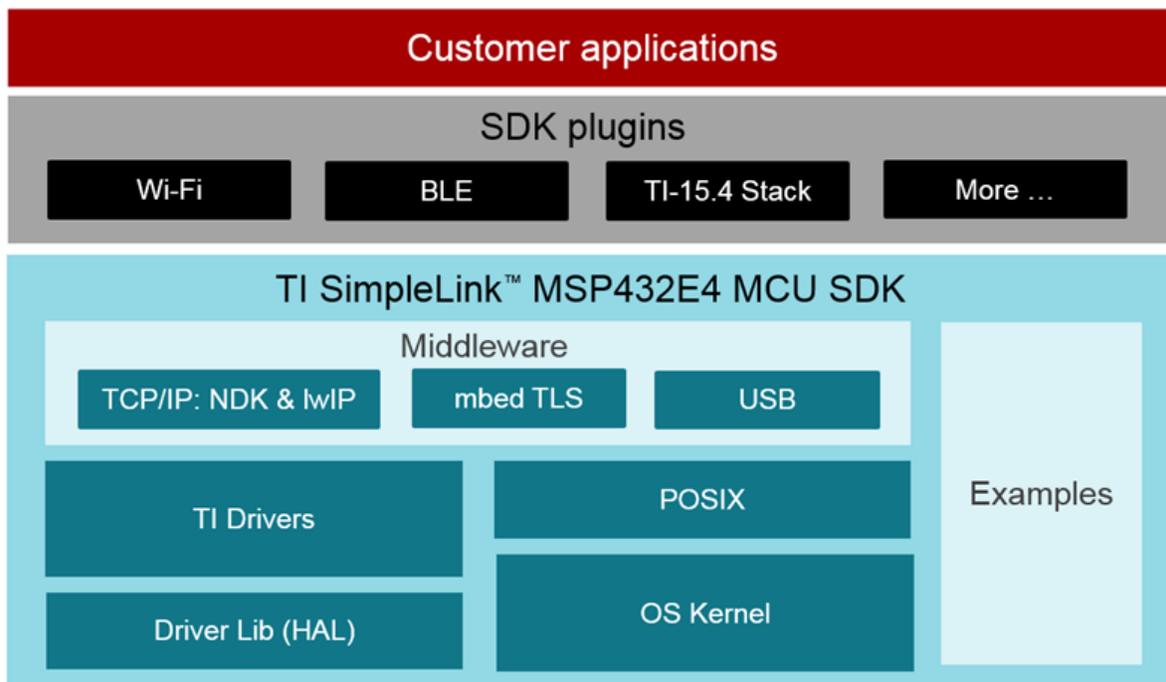

Figure 2. SimpleLink MSP432E4 Ethernet MCU Block Diagram

The innovation packed into MSP432E4 MCUs, complemented by a common development environment across the SimpleLink platform, will enable you to design a robust intelligent gateway and connect more sensors to the cloud.

Additional Resources

- Get started with MSP432E4 MCUs today with the MSP-EXP432E401Y.
- For more information on intelligent gateways, download the white paper, "Building a gateway from sensors to the cloud."
- Get connected to the cloud by walking through this SimpleLink Academy module.
- Download the SimpleLink MSP432E4 MCU datasheet.

IMPORTANT NOTICE AND DISCLAIMER