



OEM Solutions for Electric Vehicle (EV) Charging Stations

Embedded solutions and connectivity for a new era in personal transport

In the race to net zero emissions worldwide, the auto industry is undergoing a dramatic shift to electric vehicles (EVs). Smart cities — and the automakers that meet their needs — are committed to converting to electric-powered vehicles over the next two decades. [General Motors](#), for example, plans to be all-electric by 2035. Canada, China and many countries in Europe have already mandated phasing out gas-powered vehicles between 2030 and 2040.

As millions of internal-combustion-powered vehicles are replaced with EVs, a corresponding growth will be needed in EV charging stations in both urban and rural areas. Any location with an available power source — including solar panels that need not be part of an electrical grid — will be able to offer EV charging. This means it is becoming increasingly practical and necessary to offer EV charging as either a service or an amenity for shoppers, employees, and building residents. It is also an incredible opportunity for developers who are building the products and infrastructure to support the electric vehicle market.

The Growing EV Charging Station Market

The entire market for Electrical Vehicle Supply Equipment (EVSE) is expanding rapidly. Many manufacturers — both established companies and start-ups — are designing and building chargers today for EVs.

The growth of the electric vehicle market means that there is no “one size fits all” for charging stations. There is a diverse need, from small, low-cost AC chargers for the home, to heavy-duty DC “fast chargers” for recharging vehicles on a trip. The vast majority of EV charging stations will include Internet connectivity and an IoT architecture, allowing chargers to communicate with system owners, managers, and with drivers via mobile apps to find the location of charging stations, monitor the charging progress, and pay for the charge.



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Three distinct markets exist for deploying EV charging station technology:

- 1. Residential buildings:** We will charge our EVs when we are home. For homeowners, this means chargers in the garage that can bring our EV to a full charge overnight. In apartment and condominium complexes, owners will need to provide networked charging systems in parking lots and garages.
- 2. Commercial and industrial businesses:** Many companies and organizations want to provide charging stations at their facilities as a service or an amenity. This includes retail business, as well as corporations, hotel and event venues to support charging for visitors and employees. In fact, [many cities now require all new buildings to include EV charging stations](#).
- 3. Smart cities:** Today, urban centers are actively building out the [infrastructure for a greener future](#). This effort supports net zero goals as well as better environmental stewardship and cleaner air.

OEM Solutions for EV Charging

Developers need to include powerful intelligence and network connectivity in the design of EV charging stations to support multiple functions, including monitoring energy usage and charge progress, processing payments, controlling a display, remotely monitoring the status of the charging station, and updating software to manage security or functionality of the charging station. Charging stations can include streaming video technology for digital signage and paid advertising as well.

It's important to utilize a scalable development platform, like the [Digi ConnectCore® 8](#) family of system-on-modules. Digi offers products that enable OEMs to build a range of functionality into their EV charging stations as well as the connectivity required to support everything from remote monitoring and management to high-definition graphical displays and streaming video. In addition, Digi devices are built with the [Digi TrustFence®](#) security framework to ensure devices and data are secure, and offer remote device management with the cloud-based [Digi Remote Manager®](#) solution.

The Digi ConnectCore SOM Family and Supporting Tools

The highly scalable [Digi ConnectCore® SOM](#) platform is designed to support embedded developers in rapid design and development of secure and full-featured industrial products like electric

vehicle charging stations. The ConnectCore family includes SOMs, complete open-source and scalable embedded software development tools, pre-certified wireless connectivity, cloud integration and built-in security for industrial applications. This pin-compatible platform supports rapid prototyping of applications with scalable functionality to support a range of market needs.

Digi ConnectCore SOMs include a full range of features to support development of EV charging stations:

- Pre-certified dual-band 802.11a/b/g/n/ac Wi-Fi and Bluetooth® 5 connectivity
- The ultra-compact Digi SMTplus® form factor (40 mm x 45 mm) for reliability and design freedom,
- Integrated Digi Microcontroller Assist™ for 2.5 µA ultra-low power modes to save energy when chargers are not in use
- Integrated dual 10/100 Ethernet connectivity
- Seamless cellular modem and [Digi XBee®](#) wireless integration
- Industrial rating: -40° C to 85° C (-40° F to 185° F) for outdoor EV charging stations
- Certifications that ensure reliability and 10+ year product lifecycles for longevity of your products designed with ConnectCore SOMs

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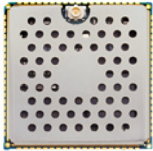
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The following is an overview of the family and supporting development tools. All ConnectCore SOMs are supported by Digi Embedded Yocto.



Digi ConnectCore MP1: The ConnectCore MP1 provides the functionality for residential small-screen chargers with communication over Wi-Fi for remote applications. It is based on the ST Microelectronics STM32MP157 microprocessor.



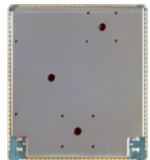
Digi ConnectCore 6UL SOM: The ConnectCore 6UL offers similar performance and functionality to the ConnectCore MP1, with the NXP i.MX6 UltraLite microprocessor.



Digi ConnectCore 8M Nano: Next in the line-up, the ConnectCore 8M Nano SOM is based on the NXP i.MX 8M Nano chip. It provides graphics acceleration for larger, more sophisticated displays and touch screens with rapid response. This SOM is well-suited for commercial charging controllers.



Digi ConnectCore 8M Mini and Digi ConnectCore 8X: These SOMs support Digi Embedded Android for easy application and interface development on networked chargers. The ConnectCore 8X offers intensive processing power for edge computation, perfect for real-time energy load balancing in chargers.



Software and Developer Tools Supporting Embedded SOM Developers

Digi supports OEMs and developers with a rich set of resources for rapid design, development and deployment, for fast time-to-market.

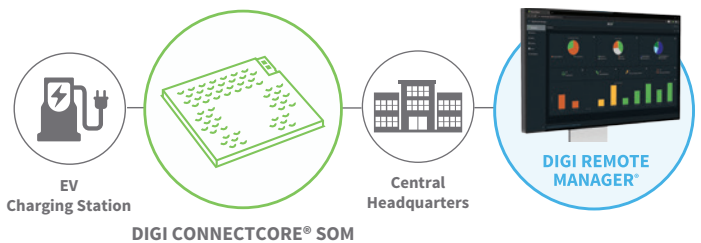
Smart IOMUX Tool: Digi created the Digi ConnectCore® Smart IOMUX Tool to help simplify the process of designing with Digi ConnectCore SOMs. The tool simplifies and accelerates connecting the needed ports and configuring pins for required features. The tool shows in real time the available ports, a method allowing developers to select features and interfaces to add or remove

from the design. The end result is a design ready to be turned into a schematic, and a Linux device tree to kick-start the software development process.

Digi Embedded Yocto (DEY) Linux Software: Yocto Project software helps designers and developers create custom, Linux-based systems for embedded products, regardless of the hardware architecture. Digi Embedded Yocto (DEY) is an open-source Yocto Project-based reference distribution for the Digi ConnectCore family. DEY includes customizations for Digi hardware as well as out-of-the-box software extensions not part of the standard Yocto Project, in order to help OEM products get to market faster.



Digi Remote Manager®: EV charging stations must be monitored for security, and their embedded devices must be periodically updated. For that reason, it is absolutely essential for EV charging station owners to be able to monitor the condition of their units remotely. Digi Remote Manager (Digi RM) provides critical information about the status of deployed devices at any time, from vir-



tually anywhere. Digi RM is a cloud-based solution that facilitates easy setup, mass configuration, maintenance and support for hundreds or even thousands of remote Digi devices.

Digi TrustFence®: Digi's integrated security framework provides built-in, multi-layer security, enabling developers to rapidly build secure, connected devices.

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The Digi XBee Ecosystem and Digi LoRaWAN Solutions

The [Digi XBee® Ecosystem](#) of RF and cellular radios, and suite of developer tools provides OEMs with a development environment for rapid time-to-market of wireless products. And Digi XBee modules integrate quickly and seamlessly with the Digi ConnectCore system-on-module family. Digi has also expanded its long-range communications portfolio with [Digi solutions for LoRaWAN®](#).

Digi's wireless communication modules come in a wide variety of pin-compatible and software-compatible modules to support a wide range of use cases. OEMs building EV charging stations have a selection of power requirements, communication ranges and protocols. The following are the most popular wireless modules, based on range.

Short-range modules

Digi XBee RF modules: Provide mesh networking for a self-forming network that connects chargers in any environment, from a parking lot with line-of-site connectivity, to inside parking structures made of concrete and steel, where Zigbee or our patented DigiMesh® networks can send signals over, under and around pillars and walls to connect to an EV charging controller.

Extended range modules

Provide communication across larger distances, to connect chargers in suburban or rural settings.

Digi XBee-PRO 900HP: Line-of-site range up to 28 miles with a high-gain antenna.

Digi XTend 900 MHz: Up to 40 miles line-of-sight range.

Digi XBee-PRO SX 900/868: Up to 65 miles line-of-site range.

Long-range modules

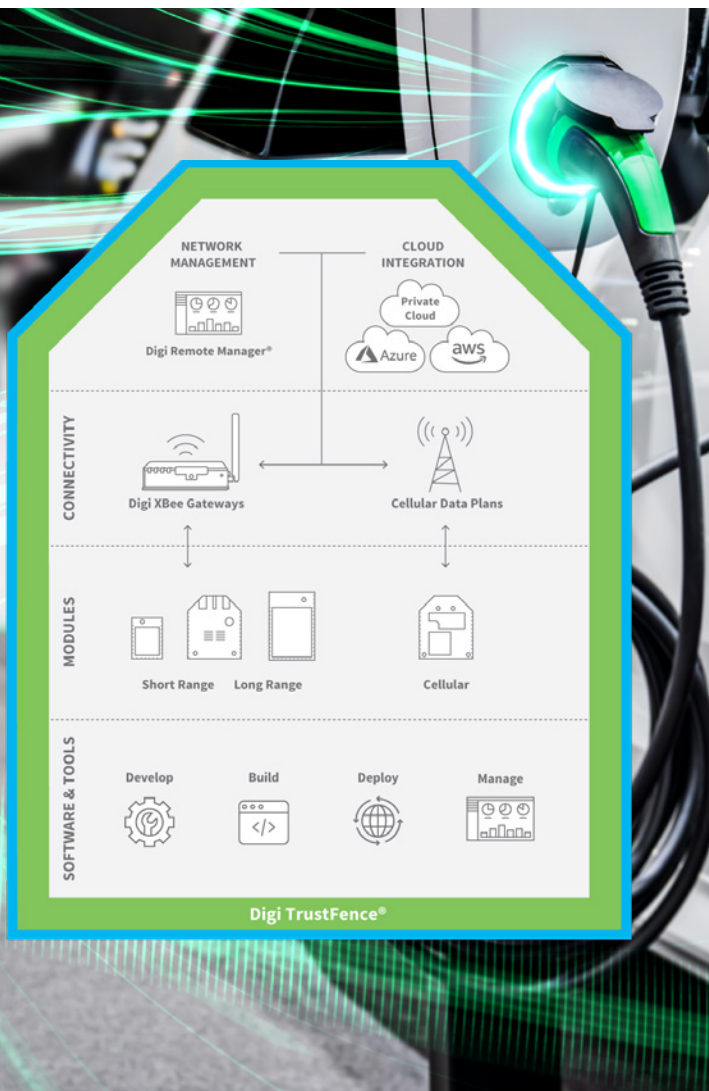
Digi XBee LR: With LoRaWAN support for low-power mesh connectivity to a gateway, with a range of up to 10 miles.

Cellular modems

Connect chargers to available cellular networks for easy connectivity without the need to build a networking infrastructure to support communication.

Digi XBee 3 Cellular Cat 1 and

Digi XBee 3 Cellular LTE-M/NB-IoT: Pre-certified cellular connectivity, managed by Digi Remote Manager.



Software and Developer Tools Supporting Wireless Product Developers

Digi provides a range of developer tools and resources — called Digi XBee Tools — for design, development, deployment and management of EV chargers that integrate Digi RF and cellular modules. For the complete range of capabilities, see the [Digi XBee Tools page](#).

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“We needed technology that could communicate in a busy, urban environment.”

Louis Tremblay, CEO, AddÉnergie

Customer Story: AddÉnergie



AddÉnergie is a Quebec-based company that designs, develops and operates EV charging stations. The company provides EV drivers and charging station owners with access control, payment and energy management services. Drivers can use an AddÉnergie VERnetwork™ charging station by simply passing an access card in front of a reader, which unlocks the charging station. Drivers can then plug in their vehicles and, when charging is complete, the charging station notifies the driver by email.

AddÉnergie designed its networks with several different Digi components, citing the ability of Digi technology to “communicate in a busy, urban environment.” AddÉnergie units include Digi XBee wireless modules, as well as Digi gateways and system-on-modules.

Read the [AddÉnergie](#) customer story 

Conclusion

EV charging stations are a critical element in our evolving transportation infrastructure and OEMs are driving change with innovation. Digi can support your go-to-market goals — with a complete ecosystem of solutions designed for rapid integration, deployment, and management. Need design and build support? [Digi Wireless Design Services \(WDS\)](#) can help!

Next Steps

- Ready to talk to a Digi expert? [Contact us](#)
- Want to hear more from Digi? [Sign up for our newsletter](#)
- Or shop now for Digi solutions: [How to buy](#)



¹ Neal E. Boudette, Coral Davenport, “G.M Announcement Shakes Up U.S. Automakers’ Transition to Electric Cars,” The New York Times, January 29, 2021

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