



# 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 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 in EV charging stations is needed 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 Electric Vehicle Supply Equipment (EVSE) is expanding rapidly. Many manufacturers — both established companies and startups — 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:** For homeowners with EVs, it's important to have a charger in the garage that can bring the vehicle 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 to support charging for visitors and employees. This includes retail businesses, as well as corporations, hotels and event venues. 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 the 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 91/93 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 enable critical security features and offer remote device management with the cloud-based [Digi ConnectCore Cloud Services](#) solution.

## The Digi ConnectCore SOM Family and Supporting Tools

The highly scalable [Digi ConnectCore® SOM](#) platform supports 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 and the availability of [Digi Connect Core Cloud Services](#) and [Security Services](#) for ongoing device and security management. This pin-compatible platform supports rapid prototyping of applications with scalable functionality for 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/ax Wi-Fi and Bluetooth® 5.4 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 10/100/1000M 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
- Robust designs that ensure reliability and 10+ year product lifecycles for longevity of your products built with ConnectCore SOMs

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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.



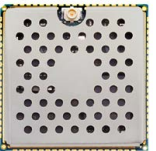
**Digi ConnectCore 91/93:** ConnectCore 91/93 family provides scalability from entry level devices without a display to higher end devices with displays and even edge AI capabilities.



**Digi ConnectCore MP2:** ConnectCore MP2 is a versatile, secure, wireless system-on-module with NPU and ISP for edge AI and computer vision applications, with complete Linux support in the Digi SMTplus form factor.



**Digi ConnectCore MP1:** ConnectCore MP1 provides the functionality for residential small-screen chargers with communication over Wi-Fi for remote applications. It is based on the STMicroelectronics STM32MP15 microprocessor. There is a lower cost variant based on STM32MP13 for entry level devices without a display (headless).



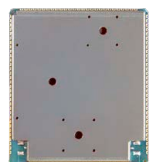
**Digi ConnectCore 6UL SOM:** ConnectCore 6UL offers similar performance and functionality to the ConnectCore MP1, with the NXP i.MX6 UltraLite microprocessor.



**Digi ConnectCore 8M Nano:** Next in the line-up, the ConnectCore 8M Nano SOM is based on the NXP i.MX 8M Nano microprocessor. 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. ConnectCore 8X offers intensive processing power for edge computation, which is excellent 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.

**Digi ConnectCore 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 the process of connecting ports and configuring pins for required features. The tool shows the available ports in real time, 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:** The Yocto Project 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 TrustFence®:** Digi's integrated security framework provides multi-layer security, enabling developers to rapidly build secure, connected devices.



For more information, visit:

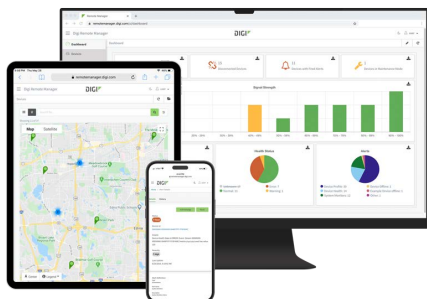
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**Digi Remote Manager®:** EV charging stations must be monitored for security, and their embedded devices must be periodically updated. For that reason, it is absolutely essential for EV charging station owners to be able to monitor the condition of their units remotely. Digi Remote Manager (Digi RM) provides critical information about the status of deployed devices at any time, from virtually 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 ConnectCore Cloud Services:** A value-added service that enables OEMs or their customers to perform device maintenance with secure over-the-air (OTA) software updates. This solution enables proactive management of deployed devices, which includes:

- Mass automation of firmware and software updates to enhance functionality, stay in compliance and scale deployments
- Monitoring of network, device and asset performance and security with bidirectional communications
- Integration of device data through open APIs to gain deeper insights and control with third-party applications



**Digi ConnectCore Security Services:** A value-added service that enables OEMs to manage security throughout the entire product lifecycle. This solution enables OEMs to create a security plan for their devices, including:

- Frequent scanning for vulnerabilities that are detected after the initial release
- A curated vulnerability report highlighting critical issues
- A security software layer including patches for common vulnerabilities and consulting services

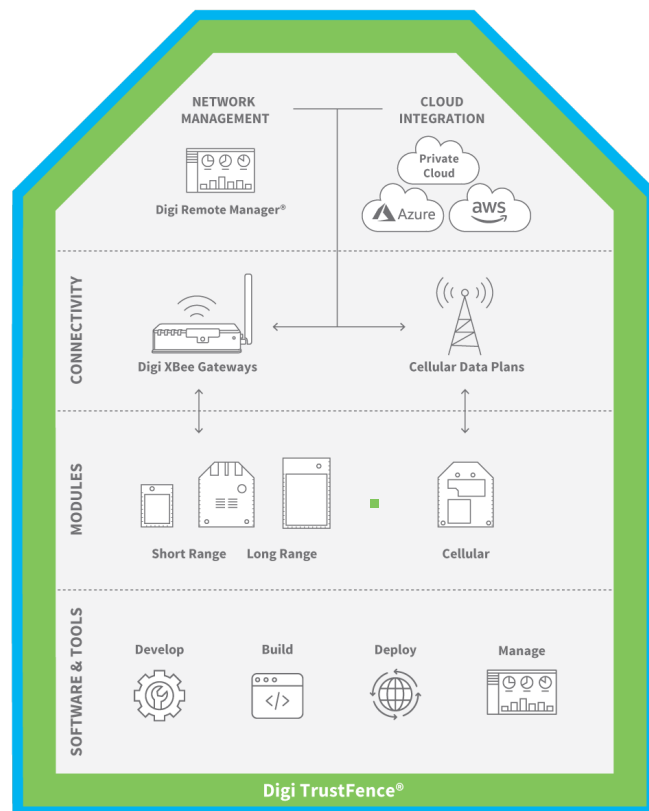


**Digi Wireless Design Services:** An expert team of design, build and test engineers devoted to supporting your design needs. Whether you need support to design security features into your EV charging station, rescue a failed design, or provide ongoing help to keep your EV charging network up to date and secure, contact WDS.

## The Digi XBee Ecosystem

The **Digi XBee® ecosystem** of RF and cellular radios, developer tools and libraries provide OEMs with a development environment for rapid time-to-market of wireless products. 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. And Digi XBee modules integrate quickly and seamlessly with the Digi ConnectCore system-on-module family.

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 protocols based on range.



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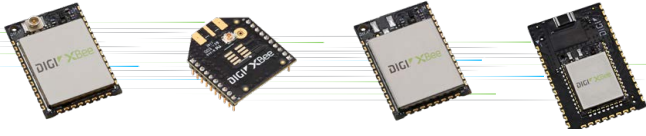
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## Short-range Modules

**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.



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

**Digi XBee XR 868:** Up to 8.7 miles line-of-site range.

**Digi XBee XR 900:** Up to 10.5 miles line-of-site range.

**Digi XBee XR 920:** Up to 5.2 miles line-of-site range.

**Digi X-ON:** A secure, reliable and scalable edge-to-cloud solution that provides all of the components needed for an LPWAN deployment 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 Cellular modems offer fast cellular connectivity, managed by Digi Remote Manager.

**Digi XBee 3 Global LTE Cat 1**

**Digi XBee 3 Global LTE Cat 4**

**Digi XBee 3 Global LTE-M/NB-IoT**

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## The Digi X-ON Solution

Digi has expanded its long-range communications portfolio with the **Digi X-ON® solution**. Digi X-ON is a complete, integrated, and easy-to-deploy solution supporting rapid rollout of scalable long-range and low power networks.



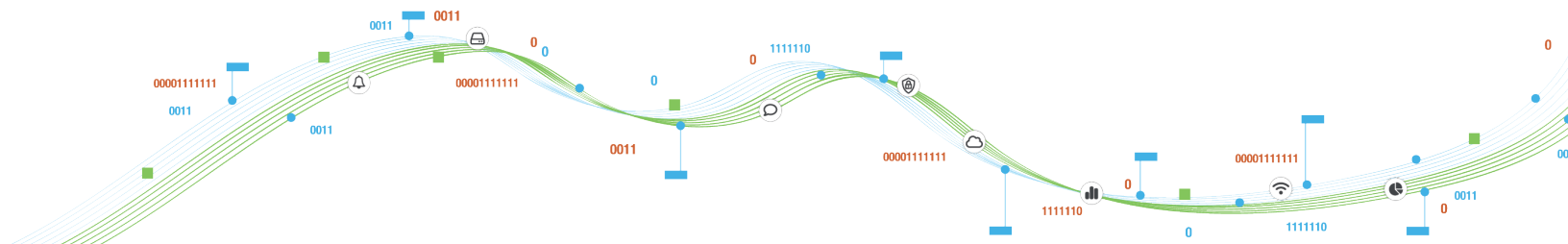
Order the North America kit

Order the Europe kit

Designed to reduce complexity and support digital transformation, Digi X-ON includes everything needed for device-to-cloud connectivity, with no engineering expertise required.

## 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](#).



**DIGI**

## Customer Story: FLO® EV Charging



“Our mission is to use technology, some existing and some that we develop, to better consume energy. With the help of Digi products, that’s what we’re able to offer.”

Louis Tremblay, CEO, FLO

FLO is Canada’s largest EV charging network, operating a comprehensive charging ecosystem that fulfills EV drivers’ needs wherever they may be — at home, at work or on the go — by ensuring a consistently simple and seamless experience.

Smart EV charging stations are connected to a centralized cloud-based management server. This central server, which is the heart of the network, contains the management software, the database and the communication interfaces that enable the operation of the network and support the EV drivers as well as the station owners. [Read the FLO EV Charging Network 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](#) 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](#)



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