

RFID CARDS VS. SMARTPHONE AUTHENTICATION: WHICH IS BEST FOR EV CHARGING?

More than one million electric vehicles are registered in the U.S.—and they all have to plug in somewhere. As EV charging stations pop up across the country, one of the chief questions will be how charging station users are identified, authenticated and connected with membership or payment systems. Radio-frequency identification cards and tokens and smartphone authentication apps have emerged as two viable options for EV charging authentication. Which is best? It may depend on the user base you plan to serve.



USER AUTHENTICATION FOR EV CHARGING

Most electric vehicle owners have a spot to plug in while at home, either in their own garage or carport or in a designated charging spot in a tenant parking garage. But electric vehicles also need spots to charge while owners are out and about. The EV charging market is broadly divided into two tiers:

- Level 2 charging stations, which operate at 208-240 V and use AC power. These stations will add 20-25 miles of range in about an hour of charging. The U.S. Department of Transportation listed more than 22,800 public Level 2 EV charging stations across the nation as of mid-2020. They are commonly found in public

parking lots and garages, hotels, grocery stores, malls and other commercial areas. They may also be installed in private parking garages and business parking lots for use by tenants, employees or fleet drivers.

- Direct Current Fast Chargers (DCFS) are designed to charge an EV battery to about 80% in 20-30 minutes. There are currently about 15,000 DCFC stations across the U.S., but their numbers are expected to explode as more people start taking EVs on longer road trips. They are commonly found along major interstate highways.

As the market evolves, user authentication requirements for EV charging stations are likely to vary by type, location and user base.

- Some commercial locations may provide Level 2 EV charging as a free amenity to shoppers, guests or employees. If there is no charge for the service, there may be no need to authenticate users at all—people can simply park and plug at any available spot. However, there may be a benefit to collecting membership data (e.g., shopper reward club).
- Public, for-profit EV charging stations, like gas stations, need a method to collect payment for their services. In some cases (especially at roadside DCFS stations), users may simply pay for the minutes used with a credit card—just like at the gas station pump. However, many EV



charging station users are already accustomed to identifying themselves with an RFID membership card or a smartphone app. Charging networks like ChargePoint and Blink enable members to access any EV charging station within their networks with a card or smartphone app, which connects to their membership, account and payment information.

- Private charging stations—such as those offered to tenants, employees or fleet drivers—may not require payment but need to ensure that only authorized drivers are accessing power and taking up valuable parking spots. An RFID card or smartphone app can be used to identify authorized drivers and track charging behaviors.

Moving forward, many EV charging stations may find that they need a mix of options for users, including membership cards, smartphone apps and a credit card payment option for out-of-network drivers.

CHOOSING BETWEEN RFID AND SMARTPHONE APPS FOR EV CHARGING

When user identification and authentication are desirable, which is the better option: RFID cards or smartphone authentication? Both have their uses in the EV charging market. In the long run, the answer may be “both.”

RFID cards are economical and easy to issue. And for some users bases, you may not have to issue a new card at all—you can take advantage of an RFID card they already carry. In many cases, it is possible to leverage existing employee IDs and membership cards for access to privately controlled EV charging stations. RFID membership cards may be a good bet for:

- Fleet drivers who already carry an RFID card for vehicle access.
- Employee parking lots and garages where people already use a card for entry.
- EV charging parking spots at gyms or other locations where you want to limit charging access to active members.

On the other hand, public charging stations may find that consumers would prefer to use a smartphone app rather than receive another membership card to carry in





a physical wallet. Many consumers prefer to carry only their phone and one or two essential cards (such as a driver's license and a single credit or debit card). As more retailers enable consumers to pay via a digital wallet app on their smartphones, some don't even carry a physical credit card anymore. Most consumers would prefer not to have to carry a physical membership card for every retail outlet they visit—and that includes EV charging stations.

Smartphone apps for user authentication are simple to set up and highly secure. Instead of RFID, they typically

use either Bluetooth® Low Energy (BLE) or Near-field Communication (NFC) protocols. For the user, the experience is almost identical to RFID authentication, except they wave a smartphone over the reader instead of a card. Apps have other user benefits, too. A custom app for EV charging can be configured to help users locate or reserve charging stations, check their balance and usage history, and change their payment options right on their phone. These features make smartphone authentication ideal for consumers accessing a network of public charging stations.

However, EV charging network managers should keep in mind that some users may still want a physical membership card. There are still some user populations, such as older consumers and those from lower income brackets, where smartphone ownership is not ubiquitous. If users are primarily using EV charging for a fleet vehicle, they may not want to download an application for work on their personal cell phone. Other users may find smartphone apps confusing or simply prefer to have a card for other reasons.

The answer for both public EV charging networks and private charging station owners is to have an RFID reader that is capable of both card-based and smartphone-based authentication. This will provide maximum flexibility as user preferences change.



FINDING THE RIGHT RFID READER FOR EV CHARGING

The best RFID reader for EV charging is one that is flexible enough to meet the needs of all user populations and evolve as requirements change. The ELATEC TWN4 MultiTech family of readers is ideal for authentication at EV charging stations.

- The readers support 60+ RFID transponder technologies along with BLE and NFC smartphone authentication. This means that one reader can support all common technologies already in use across the entire user base—both nationally and internationally. This capability becomes important for applications where you want to enable drivers to use an existing RFID card (such as their employee or fleet ID card or an access card for a tenant parking garage) for access to charging locations. It also provides more flexibility as technologies or preferences change in the future.

- TWN4 MultiTech supports advanced encryption and security configurations for highly secure transactions between the card or smartphone and the reader. This is important for EV charging applications tied to payment or employee/driver identification.
- ELATEC readers are mobile-ready. The ELATEC Mobile Badge BLE NFC App offers simple and effective components for building or extending a mobile application for EV charging networks. Non-managed mobile credentialing using the ELATEC app is free. TWN4 MultiTech readers also work with multiple existing third-party managed credential systems, such as KleverKey, Safetrust and Transact.
- The TWN4 MultiTech is easy to customize with the powerful Software Development Kit (DevPack) and App Blaster and Director utilities. Readers can be easily configured to support custom functionality (such as LED light flashing sequences or sounds for user feedback) and integration with backend software for easier member management. The DevPack tools make the TWN4 family the most powerful, versatile and sustainable readers on the market.

ELATEC
RFID Systems

11 Considerations for EMBEDDED SYSTEM RFID READERS

Radio-frequency identification (RFID) is widely used for user identification and access control for applications ranging from doors to secure printers to self-service ticketing kiosks. RFID is a simple, secure and convenient access control solution for end users and original equipment manufacturers.

RFID readers/writers come with a broad range of form factors, capabilities and configurations. When choosing a reader to embed into a system or device, it is important to make sure it fully meets all of your design specifications. You also need to make sure it will continue to meet your needs for years to come as device specification and end user requirements change.

Here are 11 considerations for product managers, embedded system engineers and solution architects when choosing an RFID design-in module solution.

Questions to Ask	ELATEC Options
Does the reader support all of the card technologies used by your customers?	• Single- and multi-frequency devices available
How much diversity exists in card technologies used by your client base?	• "Universal" multi-frequency devices work with 60+ card technologies
How many clients need to support multiple card technologies across their organizations?	• Read and write to almost any 125 kHz, 134.2 kHz and 13.56 MHz tags and/or labels
	• Supports all major transponders from suppliers including ATMEL, EM, ST, NXP, HID, LEGIC, etc.

1 Transponder Technologies

As electric vehicles move from niche to mainstream, EV charging infrastructure will need to grow and evolve to accommodate millions more drivers—both in the consumer market and in commercial fleets. With TWN4 MultiTech, EV charging station managers will be ready.

Interested in learning more about technical considerations for RFID? Download [11 Considerations for Embedded System RFID Readers](#) for additional advice, including operating power and consumption requirements, antenna placement, hardware communication interfaces and more.

Or, **contact us for a customized demonstration** of our user identification and access control solutions for EV charging.

For more information contact our Application Specialists at the locations below:

elatec.com

EMEA

Puchheim, Germany
+49 89 552 9961 0
sales-rfid@elatec.com

AMERICAS

Palm City, Florida, USA
+1 772 210 2263
americas-info@elatec.com

ASIA

Shenzhen, China
+86 158 1759 1668
apac-info@elatec.com

AUSTRALIA

Sydney, Australia
+61 449 692 277
apac-info@elatec.com

JAPAN

Tokyo, Japan
+81 355 799 276
japan-info@elatec.com