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How Standardization, SEPs, and Patent Pools Can Benefit the EV and Battery Industries

Technical standards are industry norms that enable interoperability, promote safety, and create economies of scale. While technical standards are intended to be implemented on a wide scale in the mass consumer market, many standardized technologies are protected by patents (known as standard essential patents or SEPs). With standardization poised to dramatically impact the battery and electric vehicle (EV) charging industries, stakeholders must carefully balance the rights of patent owners against the needs of the industry.

Introduction to technical standards and patents

A standard provides a set of technical requirements and guidelines that enable different systems and/or components to interoperate using a common technological language. Our modern technological society would not be possible without technical standards, although dependence on technical standards is particularly strong in the internet, telecommunications, and automotive industries.

Examples of widespread technologies that are enabled by technical standards:

EV charging (e.g., the North American Charging Standard and the Combined Charging System)

Wireless communications (e.g., Bluetooth and 3G/4G/5G)

Information compression (e.g., JPEG, PNG, GIF, MP4, and MPEG)

The benefits of standardization are numerous:

- **Increasing interoperability** by ensuring that different components use the same technologies and technical language to harmoniously coexist
- **Promoting advancement and collaboration** in technology by encouraging and enabling many companies to work together to develop the best ideas to include in a technical standard
- **Improving safety and reliability** by helping to ensure that products adhere to technological guidelines designed to be robust and protect consumers (this is particularly important in the battery industry, where fundamental aspects of energy storage and energy transfer must be achieved in a reliable and safe manner)
- **Creating economies of scale**, especially as standards become widely adopted and global in implementation
- **Laying the groundwork for future innovation** by identifying areas for future technological development and innovation and by developing technical specifications that are forward-compatible with those future technologies

Consumers reap the benefits of technical standards regularly. For example, when we travel to a different country, technical standards allow our phones to work seamlessly on any network. The need for interoperability is a driving force for standardization in the EV charging industry, as it would enable consumers to charge their vehicles using any charging station around the country or the world.

The ubiquity of technical standards is evident in the vehicles that we drive every day. A typical automobile implements dozens of different technical standards, ranging from wireless communication standards that enable the vehicle to communicate with the network infrastructure or other vehicles, wireless charging standards like the Qi standard that charges smartphones, and vehicle charging standards for fueling electric vehicles.

Standard setting organizations

Standards are established and promulgated by groups called standard setting organizations (SSOs), which are also sometimes referred to as standard development organizations. These are voluntary organizations of industry stakeholders, such as private companies and government organizations, that collaborate to develop and implement standards. These stakeholders voluntarily contribute technical ideas to an SSO to be included in a standard. In return for voluntarily contributing their ideas, stakeholders (especially private companies) typically expect some payoff at the end, such as through an expectation that they'll be able to monetize the implementation of the standard through licensing and royalties of patents that cover the standard (more on standard essential patents below).

There are dozens of notable SSOs, each of which develops hundreds if not thousands of standards that cover various aspects of different technologies. For example, SAE International (formerly known as the Society of Automotive Engineers), is the SSO that standardizes electric vehicle charging technologies, including CCS and NACS. SAE is a large organization that has three main areas of standardization, including aerospace, ground vehicle, and systems management. To illustrate the scale of this single SSO, the hundreds of committees that constitute the "ground vehicle" focus of SAE have developed nearly 2,000 standards. See Figure 1 below for an example of a typical standards development process.

Standards development process

Figure 1: Standards development process

Standard essential patents

Just as with any other technology, the technologies that are specified in standards can be covered by patents. These patents are known as standard essential patents (SEPs). A patent is a form of intellectual property (IP) that provides its owner the right to exclude others from making, using, selling, or importing the patented invention. Parties who wish to use a patent may avoid patent infringement liability either by taking a license to the patent or redesigning their technology so as to avoid the use of the patent.

However, a patent is not a right to practice the invention it covers. For example, other companies or individuals may own patents that cover parts of a particular inventor's invention. In that case, the inventor may not be free to implement their own technology unless they obtain a license for the parts of the technology that are covered by patents owned by those other entities. In some scenarios, the inventor and patent-owning third parties may need to cross-license from each other so that they both can pursue their respective technologies.

SEPs are patents that cover technologies that are essential to the implementation of a standard. To put it a different way, a patent is "standard essential" if anyone who implements the standard necessarily infringes the patent. There is an inherent tension between patents and standards. Patents are designed to be exclusive — i.e., to exclude others from practicing a technology. On the other hand, standards are designed to be inclusive — i.e., to include others in the adoption of a technology. SSOs are keenly aware of and sensitive to the inherent tension between standards and patents and thus place limits on the licensing fees SEPs owners can charge implementers.

Licensing approaches

Generally, there are two ways to license patents: conventional bilateral licensing and licensing through patent pools.

Conventional bilateral licensing involves direct negotiations between a patent owner and an implementer. For SEP's, this licensing must be negotiated under fair, reasonable, and non-discriminatory (FRAND) terms, as required by the specific SSO of the standard that the SEP covers. One problem with the conventional approach is that a company that implements a technical standard may be required to license dozens of different SEPs from numerous patent owners. This can lead to inefficiencies and increased costs, as well as increased litigation risk between the numerous individual parties.

An alternative that has been widely used to address these problems is the patent pool. Patent pools have been used for decades and are not specific to SEPs. A patent pool is a collection of patents that is managed by an administrator who serves as an intermediary between the patent owners and the implementers who license the pool's patents. For SEP patent pools, the administrator establishes agreements between the SEP owners and the implementers to license the collection of patents on FRAND terms.

Patent pools are well-suited for licensing SEPs, which cover numerous technologies that involve many patents covering different parts of a standard. A patent pool is a "one stop shop" that enables an implementer or licensee to acquire a single license from the patent pool that provides access to technologies covered by all of the patents within that patent pool. A patent pool can greatly simplify the administration of licensing a broad collection of patents, which simplifies the licensing process for both patent owners and implementers. See Figure 2 on the next page for a schematic comparing conventional bilateral licensing and patent pools.

With conventional bilateral licensing, each licensee must individually license different patents from each patent owner. With patent pools, an intermediate license administrator manages the pool that contains all the patents that have been submitted by the patent owners for licensing. The administrator creates a single license that provides access to all of the patents owned by the patent owners and makes those patents available for licensing to all of the licensees. By agreeing to the single license offered by the administrator, a licensee can obtain access to all of the technologies covered by the patents in the patent pool without having to individually negotiate with each patent owner. In the SEP context, a licensee theoretically need only obtain a single license from the patent pool that covers a relevant standard. In practice, however, if there are other patent owners who are not part of the patent pool, the licensee may also need to separately negotiate with those other patent owners outside of the patent pool.

Patent pools offer benefits to both patent owners and implementers, such as:

- Allowing for widescale access to enabling technologies
- Providing freedom to operate for implementors
- Reducing transaction costs (multiple patent rights in a single transaction)
- Mitigating litigation risk
- For patent owners, minimizing the problem of blocking patents by cross-licensing and
- For implementers, accessing all complementary patents necessary for a standard

As a practical matter, patent pools also allow for centralized and professional administration of licensing through a dedicated administrator who manages negotiations and licensing between the numerous patent owners and implementers.

Bilateral licensing vs. patent pools

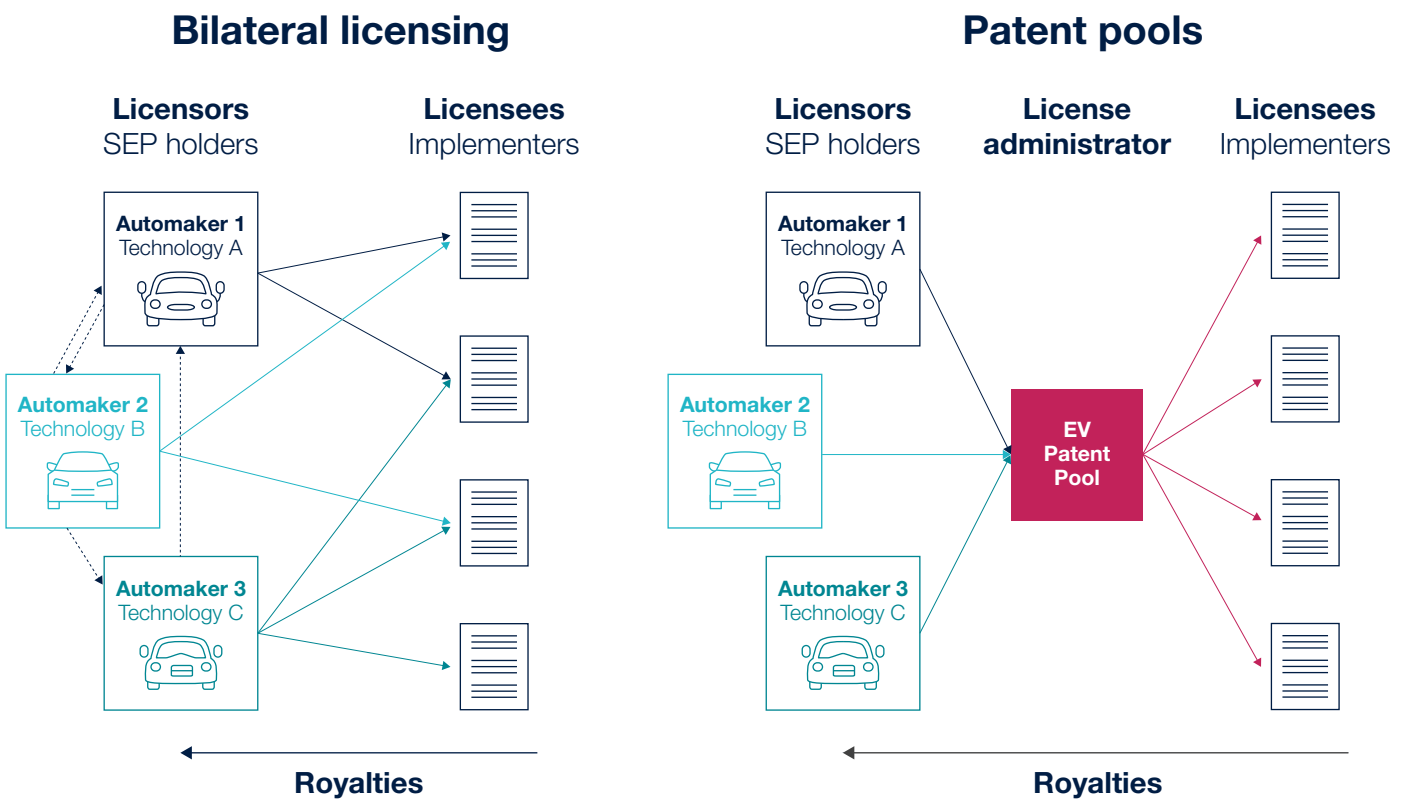

Figure 2: Bilateral licensing vs. patent pools

Standards and patent pools in the battery industry

There are several SSOs that are creating and promulgating standards in the battery industry, with some of the most well-known including:

- Society of Automotive Engineers (SAE)
- International Electrotechnical Commission (IEC)
- International Organization for Standardization (ISO)
- Institute of Electrical and Electronics Engineers (IEEE)
- Underwriters Laboratories (UL)

EV charging technology is covered by numerous standards that have different specifications. For example, standards cover each charger connector type and their corresponding power output, which offer both advantages and disadvantages in terms of performance. (See Figure 3.) The three most common EV charging standards in the United States are the J1772 standard, the Combined Charging System (CCS), and the North American Charging Standard (NACS). The NACS standard is also known as the Tesla standard.

A growing number of patent pools have arisen to license patents that cover various aspects of the above charging standards. For example, Via LA (formerly Via Licensing and MPEG LA) is a patent pool that traditionally was focused on the field of video compression but has expanded into EV charging. Numerous SEP owners have joined the Via LA to license their vehicle charging-related SEPs to implementers, including LG Energy Solution, GE Hybrid Technologies, Robert Bosch, and Siemens. Via LA licensees can license over 100 EV charging patents in a single licensing transaction, thereby ensuring that they are able to implement the standard technologies those patents cover. Avanci is another major player in the EV patent licensing market, and LG Energy and Panasonic Energy recently launched a new patent pool containing over 5,000 lithium-ion battery patents called Tulip Innovation.

	Level 1	Level 2	DC Fast Charging
Connector type	J1772	J1772	CCS, CHAdeMO, NACs
Voltage	120 V AC	208-240 V AC	400-1000 V DC
Typical power output	1 kW	7-19 kW	50-350 kW
Estimated PHEV charge time from empty	5-6 hours	1-2 hours	N/A
Estimated BEV charge time from empty	40-50 hours	4-10 hours	20-60 minutes
Estimated electric range per hour of charging	2-5 miles	10-20 miles	180-240 miles
Typical locations	Home	Home, workplace, public	Public

Figure 3: EV charging overview

Source: U.S. DOT (https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds -)

Strategic considerations for SEP owners

SEPs can be immensely valuable for their owners. To understand why, it helps to imagine a patent as a tollbooth on a road. If others want to implement a patented technology, they must pay a licensing fee (i.e., a toll). However, just as there are alternative routes to a particular destination to avoid a toll, potential technology implementers can craft design-arounds to avoid licensing the patent at issue. With SEPs, there is only one road to a given destination and that road has a toll booth, so that anyone who wants to go to that destination must travel that road and pay that toll.

How SSOs deal with SEPs

Given the potential for unfairness inherent in this system, SSOs place limits on the amount of the toll (i.e., royalties) that the toll collector (i.e., SEP owner) can charge by requiring SEP owners to license their patents on fair, reasonable, and non-discriminatory (FRAND) terms. The goal of FRAND requirements is to achieve a balance between compensating SEP owners and ensuring that the compensation is not overly burdensome for others to license and implement the standard. The problem, however, is that SSOs typically do not provide detailed guidance on what constitutes “FRAND” in a particular case. Instead, the parties are expected to negotiate on their own. The question of whether a particular license satisfies an SSO’s FRAND requirements typically is settled by an arbitrator or a court.

Each SSO has its own IP policy, but most require their members to notify the SSO if they have any patent claims that are essential to the standard. If they do, the patent owners have three options:

1. Agree not to enforce SEPs against implementers
2. Agree to license SEPs without compensation or
3. Agree to license SEPs on FRAND terms

Patent owners are responsible for identifying and declaring patent claims they believe are essential to a standard. Most SSOs do not take responsibility for:

- Identifying essential patent claims
- Assessing the validity, essentiality, scope, enforceability, or other merits of patent claims or
- Determining whether SEP owners' licensing terms are FRAND

SEP owners typically must submit letters of assurance agreeing to their SSOs' IP policies, which in most cases are binding upon successors-in-interest to the encumbered patents.

How companies can build an SEP portfolio

The first way to build an SEP portfolio is to develop it in-house. SEPs begin their lives as all patents do (i.e., as ideas), but there are important differences in how those ideas are generated, disclosed, and patented. The initial step of R&D for an SEP requires identifying specific technological features that are likely to be incorporated into a standard, which requires in-depth knowledge of the existing standard as well as future directions of the standard. The process of patenting SEPs also presents unique challenges. Prospective SEP owners seek not only to ensure a patent grant by the patent office, but also "standard essentiality" for the claims of that patent (which is complicated by constant changes in the technical standard itself and in the legal landscape of standard essentiality). Another key aspect of building an SEP portfolio involves interactions with SSOs, many of which have specific disclosure and declaration requirements that SEP owners must satisfy. Finally, the ultimate goal of monetizing SEPs (e.g., through licensing) should always inform how an SEP portfolio is built. For example, most patent pools have specific requirements on the types of SEPs they will accept into the pool for licensing. SEP owners seeking to join such pools would be wise to think ahead and build their SEP portfolios to satisfy such requirements. The myriad factors involved in building an SEP portfolio require both in-house and outside counsel to be deeply familiar with the technical standard, the standard-setting process, the law of standard essentiality, and SEP licensing. Generally, the process of developing an SEP involves the following steps:

Research and development: Identify a standard and develop a technology for the standard.

Apply for a patent: Prepare and file patent applications on the technology.

Disclose the technology to the relevant SSO: Submit the technology to an SSO as a candidate for inclusion in the standard.

Declare the patent to the SSO as essential: Identify the patent as essential and promise to the SSO that you will license the patent on FRAND terms.

License the SEP to implementers: Monetize the SEP through licensing, either directly to other companies or through a patent pool.

The second way to build an SEP portfolio is to acquire SEPs from other companies. While this strategy generally is more time-efficient and can be more cost-effective than building an SEP portfolio from the ground up, there are several limitations to keep in mind. First, the initial step of acquiring SEPs can be challenging due to constraints on supply and/or difficulties in negotiating the acquisition. Also, companies considering acquiring SEPs should consider any pre-existing obligations that encumber those SEPs. As examples, most SSOs require FRAND obligations to run with the patent, and most patent pools have specific requirements on transferring ownership of patents that belong to the pool. Therefore, before purchasing an SEP, a company should be prepared to comply with any such pre-existing obligations and also ensure that the previous SEP owner fulfilled all of its duties to the SSO and any patent pools to which it belonged.

The cost of doing nothing

Of course, there is always the option of doing nothing, but few patent attorneys would recommend that strategy. Traditionally, SEPs and the strategic considerations that go along with them were limited to a handful of industries, most notably the telecommunications industry. That is no longer the case, as demand for connected products, including EVs, accelerates. Companies that are not prepared must pay. If other companies own SEPs that your company must implement, you may be forced to pay royalties either to that company directly or to a patent pool to which the company belongs. However, if you have your own SEPs, you can use those SEPs to cross-license with other SEP-holding companies.

The cost of doing nothing is particularly steep in the automotive industry. As vehicles have incorporated telematic units that communicate by cellular connections, not only has this opened the door to a new world of technological capabilities for vehicles but it has also opened the door to a new world of patent issues due to SEPs that cover those telecom standards. The same patent and SEP issues that once were mostly limited to the mobile phone industry are now impacting the automobile industry.

Auto companies historically have not developed telecom SEPs of their own, and this has left them vulnerable to patent assertion entities that own telecom SEPs and assert those SEPs against them. In response, auto companies have quickly ramped up their telecom SEPs and have joined various SEP licensing pools. But this may be just the beginning – as automobiles become electrified and technologies associated with electrification become standardized, SEPs for those electrification technologies are also poised to become an issue for automakers.

The risks and rewards of SEPs

SEPs carry both risks and rewards for their owners.

The risks are numerous. For example, even if you invest heavily in building an SEP portfolio, there is no guarantee that your technology will be adopted into the standard, nor that the standard itself will be widely adopted. FRAND obligations can also present headaches for SEP owners, as they restrict the amount of royalties SEP owners can receive. And many SSO IP policies prohibit SEP owners from engaging in certain patent enforcement actions (e.g., seeking an injunction or exclusion order against infringers) until they can show that they have made a good-faith effort to seek a license.

On the other hand, the rewards are obvious. SEP allow their owners instant revenue streams through global licensing opportunities. While FRAND obligations limit the royalties an SEP owner can collect from any individual licensee, SEP owners can nonetheless reap significant rewards through volume. If the standard your patents cover becomes ubiquitous, royalties through your SEPs can be significant.

Recent developments in the SEP landscape

The SEP landscape is constantly evolving, especially in the EV and battery industries, where SEPs and FRAND obligations are new concerns. In 2019, the Department of Justice, the U.S. Patent and Trademark Office, and the National Institute of Standards and Technology issued a policy statement that attempted to establish guidelines on infringement remedies for owners of FRAND-encumbered SEPs, but withdrew the statement in 2022 after determining that the existing legal and regulatory scheme best served the public interest. SEP regulation efforts have fared better in the European Union, where, in February 2024, the European Parliament approved a 2023 European Commission SEP regulatory proposal. Stakeholders (and courts) have also recently debated whether SEP owners refusing to license to suppliers (versus original equipment manufacturers) is discriminatory and in violation of FRAND requirements. *See, e.g., Continental Automotive Systems, Inc. v. Avanci, LLC, et al.*, No. 20-11032 (5th Cir. Feb. 28, 2022). At the SSO level, recent changes to IP policies may give SEP owners a stronger position in licensing negotiations, such as the IEEE's 2023 IP policy update that allows the parties to consider licenses obtained through the threat of an injunction when determining a reasonable royalty rate for FRAND purposes.

SEPs and FRAND considerations, once mostly limited to the telecommunications industry, have now emerged as major issues in the EV and battery industries. Companies that ignore the new reality do so at their peril, as those that fail to develop SEP portfolios will inevitably find themselves in the unenviable position of perpetual licensees. Stakeholders in the EV and battery industries should act now to reap the benefits of standardization, SEPs, and patent pools.

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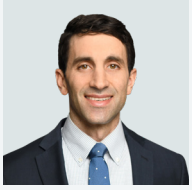

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