Cloud-controlled charging

ABB's connectivity solutions are changing the electric vehicle charging industry

HANS STRENG, JOOST VAN ABEELEN – Just as apps have added a whole new dimension to mobile device use, so too has cloud-based connectivity changed the face of electric vehicle (EV) charging. It is not enough that a charger simply charges a vehicle – today, charging operators require safe, secure connectivity solutions that allow them to run their charging networks much more efficiently and reliably, while maintaining maximum flexibility in a constantly evolving industry. ABB chargers come complete with a package of connectivity-based services, including remote maintenance and diagnostics as well as interfaces to service providers to enable subscriber management applications. Data protection complies with the highest data security standard (ISO 27001).

The EV charging market is rapidly evolving and so is the evolution of customers' needs.

The benefits of cloud computing are widely recognized in different industries. In the past few years, software as a service (SaaS, also referred to as cloud computing) has been incorporated into the strategy of all leading enterprises. Many businesses allocate as much as 70 to 80 percent of their IT budgets to regular updates and software maintenance for existing infrastructure. SaaS enables businesses to reduce IT support costs by outsourcing hardware and software maintenance to the SaaS provider. Cloud computing also makes it possible to update and maintain Web applications without distributing and installing software on potentially thousands of client computers, and it provides the inherent support for cross-platform compatibility.

Title picture
Electric vehicle charging at a gas station in Estonia

ABB's connected service offerings
EV charger connectivity is essential to the future of the charging market ➜1, with cloud computing easily eliminating many of the complex constraints from the traditional computing environment, including space, time, power and cost. Utilizing connected services via the cloud enables ABB customers to change the way they use technology to service their own customers, partners, and suppliers. The advantages are numerous, but the most important ones are the resulting flexibility and cost savings.

Cloud computing means that customers can access the data they need anytime and anywhere, even when they are working remotely or outside office hours. With the cloud there is no need for customers to purchase and install expensive software because it is remotely available, generating a huge cost-savings – especially on offerings that require frequent updates to stay competitive. The added flexibility enables ABB customers to quickly and easily scale according to demand. This can be particularly advantageous when there are temporary peaks in demand, such as on holidays or in summer.

Connectivity enables efficient and effective maintenance and support of each charger in the field. At the same time, connectivity also allows ABB to monitor both the development of the market and customer requirements. The EV charging market is rapidly evolving and so is the evolution of customers' needs ➜ 2.

Providing high value–added services via the cloud
Because they are provided via the cloud, ABB connected services are compatible with any charging network or payment and billing platform available today. This means that customers can simply connect to one central point (ABB's Network Operations Center) to gain individual access to each charger in their field as part of their network. Through open-standards-based interfaces, all ABB EV chargers allow remote monitoring, proactive

1   The electric vehicle charging industry is benefitting from cloud connectivity services such as those provided by ABB.

2   ABB's Galaxy online management tool provides access to real-time data and usage statistics from Terra chargers.

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maintenance and functional upgrades to provide its customers with the tools necessary to gather customer-specific usage statistics and reports ➔ 3. This setup benefits both ABB and its customers.

Firstly, most customer-specific configuration is pushed into the cloud and implemented via software. This means that the chargers are essentially identical, which offers tremendous economies-of-scale in the total supply chain as well as in servicing. And managing charger updates and upgrades becomes much simpler, both in terms of hardware and software.

Secondly, the network-based configuration enables future functionality, such as integration into larger smart-grid configuration, without changing anything on the chargers. Finally, by supporting open interfaces and implementing them as cloud interfaces rather than customized charger interfaces, customers can in principle still work with other charger suppliers who have chosen to build stand-alone (unserviced) chargers. Customers are thus offered all the benefits of a cloud-based platform ➔ 4.

Significantly reduced investment costs
Software developments are capital-intensive investments and, historically, many software development projects fail to achieve their goals. With the cloud-based approach, customers do not need to make costly investments in hardware customization nor must they invest in
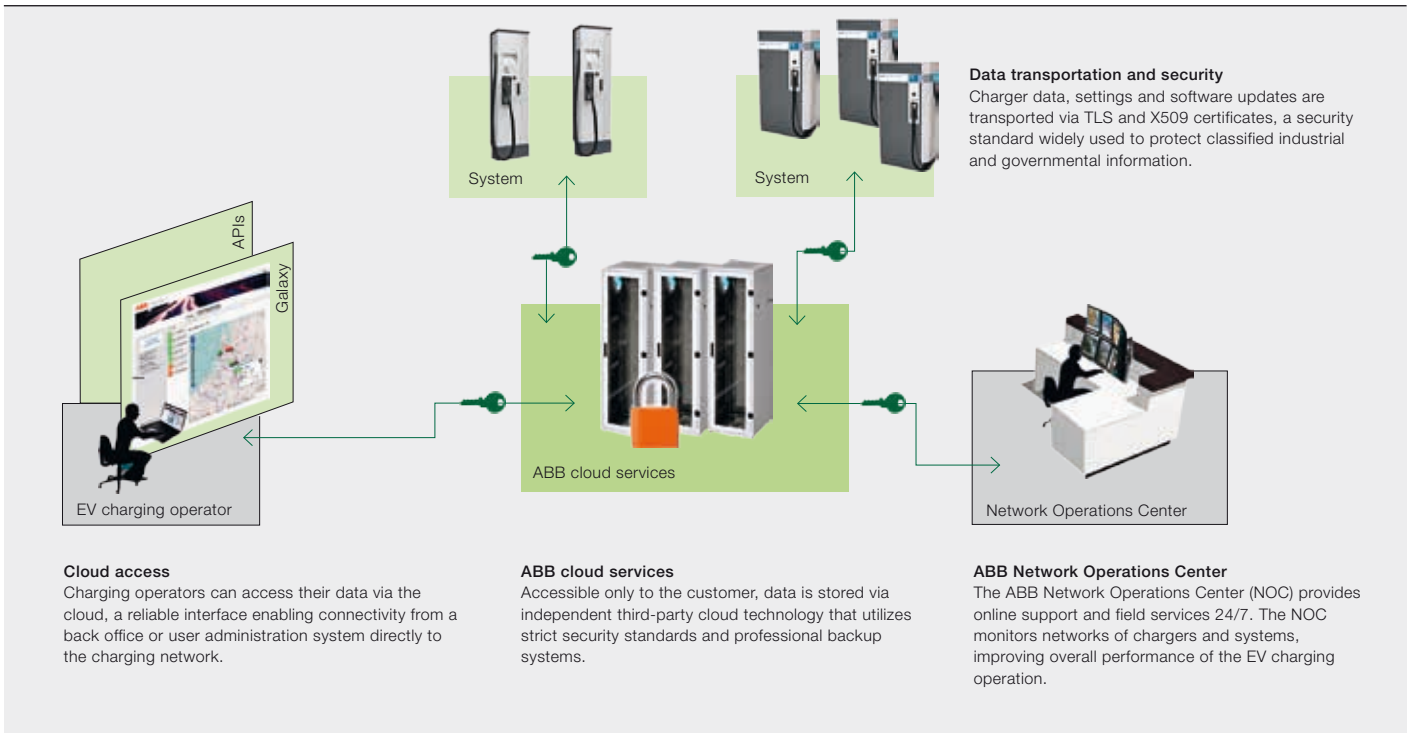
customization-related software development and IT integration. With ABB's connectivity solutions, customers must simply activate the licenses to use the software. The development and maintenance of the software is covered by a monthly fee.

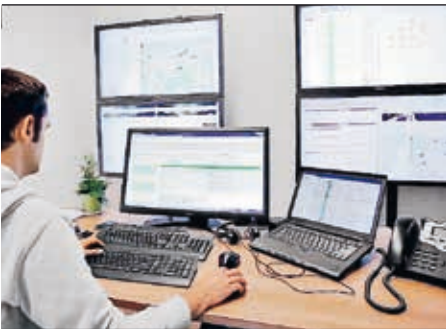## Access to state-of-the-art services and open standards
The strategy for providing connected services via the cloud allows ABB to pass on huge cost savings to customers via same-time deployment of software services and upgrades. A customer no longer has to worry about updating chargers individually, but can instantly receive upgrades while benefiting from any automated developments courtesy of the cloud. For example, a recently released ABB service pack provided software updates containing both existing as well as new functionality (ie, security updates and language support, respectively).

Supporting open standards and secure protocols, ABB provides the connected services that in turn support the business models of its customers and that generate additional return on investment to their current and growing EV charging infrastructure. Because ABB provides B2B (business-to-business) solutions, it is up to its customers to decide which B2C (business-to-consumer) solution meets their needs. ABB connected services enable customers to easily switch to other B2C offerings – rather than changing the connection for each and

Data transportation and security
Charger data, settings and software updates are transported via TLS and X509 certificates, a security standard widely used to protect classified industrial and governmental information.

APIs

Galaxy

System

System

EV charging operator

ABB cloud services

Network Operations Center

Cloud access
Charging operators can access their data via the cloud, a reliable interface enabling connectivity from a back office or user administration system directly to the charging network.

ABB cloud services
Accessible only to the customer, data is stored via independent third-party cloud technology that utilizes strict security standards and professional backup systems.

ABB Network Operations Center
The ABB Network Operations Center (NOC) provides online support and field services 24/7. The NOC monitors networks of chargers and systems, improving overall performance of the EV charging operation.

4 Remote access to charging data is a key advantage of ABB's cloud-based offering.

every charger in their network, they would only need to do so at one location.

Cloud-based platforms have been around for years already: Cars are increasingly developed as connected machines (eg, every Nissan LEAF has a SIM card, making it like a phone on wheels), and smart meters appear in many households and offices. So it is fitting that a connected charging platform also becomes standard. What is more, as the world enters the era of vehicle-to-grid (V2G) where the battery buffer of the car can be used to supply power back through the charger (a practice already mandatory in Japan), then a connected charging platform is essential.

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The next step in EV charging
When it comes to creating a smarter grid, the concept of using electric vehicles to store surplus electricity as a backup power source is particularly interesting. Utilities could potentially use the batteries of parked electric vehicles while they are connected to the grid to store electricity when it is plentiful. When electricity is in short supply, electric vehicles could provide short-notice reserve power (ie, V2G) to meet demand peaks, relieving pressure on utilities to provide reserve generating capacity and evening out the variability incurred by renewables. Connectivity enables the integration with SCADA (supervisory control and data acquisition) and other

distribution management systems, putting more analysis and control functions in the hands of grid operators. Some of these technologies can be used, for instance, to ensure that EV charging happens only when energy is available, rather than randomly, mitigating the impact of the additional load on the grid.

ABB has all the elements required for smart grid functionality. The company offers solutions (both hardware and software products, or connected combinations thereof) that enable its customers to make a viable business of selling and operating charging services or load-management services.

For more information about ABB's electric vehicle charging offering, please visit http://www.abb.com/evcharging

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