Caburn Telecom

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The critical role of wireless connectivity for public EV charging points

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The market for charging electric vehicles (EVs) is fragmented. It encompasses commercial and political activity as well as diverse technologies and suppliers with widely different roles. Right now the market is relatively small but set to grow rapidly in the near- and medium term and become a critical resource. Realising that objective will involve networks that can scale and cover hundreds of different locations comprising huge numbers of charge points. It's a complex task and one that can mask the importance of the connectivity component, write Beecham Research's Bob Emmerson and Robin Duke-Woolley.

IoT systems acquire data from devices, process it for use in applications, and generate real-time information that is communicated to third parties. In EV charging, the public charge points are the devices. They process metering and user data and communicate the information so that the users can be billed, and the utility and communications companies can be paid. In both cases uptime is critical.

A report recently published by Beecham Research into "Why IoT Projects Fail" found that the complexity of the connectivity part of IoT solutions is often underestimated and that this is a major cause of IoT project failures. Setting up wireless networks for high usage IoT applications is not a simple matter of plug and play. Neither is it a straightforward process to scale up networks from a few sensors in a trial or proof of concept to a nationwide service with high reliability. Connectivity is a crucial resource and must be planned at an early stage of an IoT project to ensure its long-term success.

A demanding, evolving market

Public electric vehicle charge points are metered so that the users can be identified and billed and they are monitored so that the operator can see the site's status in real-time. This business process relies on real-time communications; from maintenance status, operational monitoring and usage-metering through to user IDs and payment. Secure and resilient mobile communications is essential even where there is a fixed line connection. GSM back-up should be designed into the system as an emergency standby in case of connectivity issues. Then, should the fixed line fail, the charge point will remain operational, no revenue will be lost and user satisfaction will be maintained.

In January 2020, a report commissioned by the European Federation for Transport and Environment indicated that after years of slow progress electric vehicles were finally coming to Europe. At the end of 2019, there were around 185,000 public charge points in the EU, or seven cars for each point, comparing well with EU guidance of a minimum of 10 vehicles per point. A clear majority of these public charge points were slow chargers, but the network of fast and ultra-fast charge points was progressing well. After 2020, considerably more charging infrastructure will be needed to keep pace with the now rapidly growing e-mobility market and more effort will be needed to ensure seamless, fast and reliable charging within and across countries.

Research conducted by Berg Insight indicates a CAGR of 31.1% in Europe, which equates to a charging point increase from 1.3 million in 2019 to 5.2 million in 2024. The CAGR in North America over the same period will be 26.7%. These numbers include both private and public charging points. Most connected charging points in Europe and North America are located in public or semi-public charging stations. Nevertheless, the number of connected home charging points is expected to increase as homes get smarter.

Figure 1, which comes from Arthur D Little, indicates that the industry is currently in the consolidation stage, which is being followed by significant growth up to 2026.

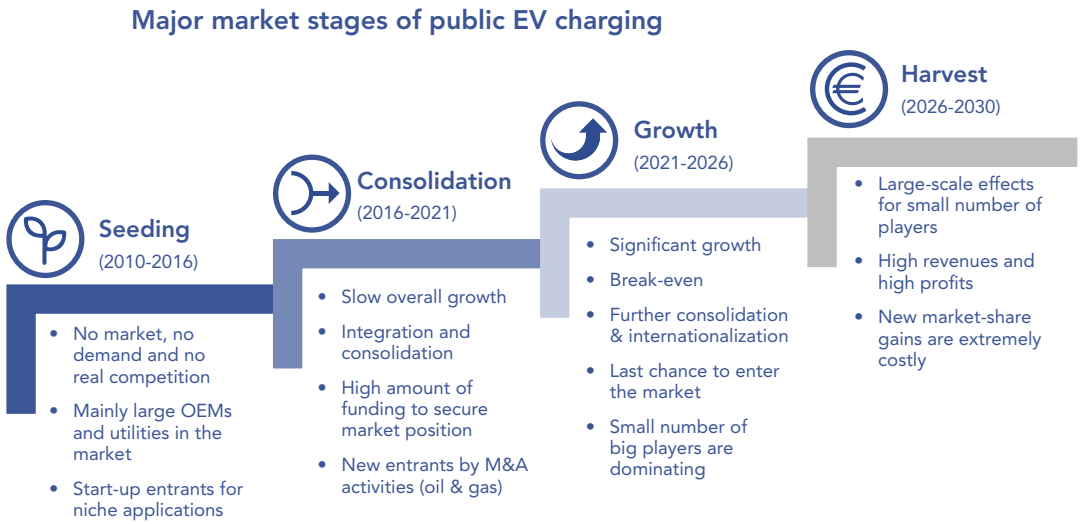


Figure 1. Source: Arthur D Little analysis.

The user's perspective

Users of EVs expect to be able to charge their vehicle when it's needed and that need can become urgent on long journeys. Drivers will normally plan their route and will employ a service such as Zap-Map that displays the location of the charge points in the UK, but if they are not operational users will be frustrated and alarmed.

There is anecdotal media coverage and research data that indicates outages have already become a serious issue. A UK 2019 survey conducted by Zap-Map found that almost 25% of public charge points were out of service. Of those, 7.5% were flagged up with a problem, shown on the mobile phone app, while 16% were not communicating their status, leading Zap-Map to assume they were not working. This suggests that the charge point operators (CPOs) were either unaware of the status of the charge points or unable to rectify them remotely. It is hugely frustrating for users – already subject to range anxiety – to find that available charging points are in fact not working and unless this critical issue is addressed, CPOs will suffer reputational damage and loss of market share that will become increasingly severe over time.

A recent market research study commissioned by Castrol interviewed 10,000 consumers and fleet managers in eight countries. The survey indicated that mainstream EV adoption will occur when a typical vehicle costs £27,000 (€31,500), can realise a range of around 290 miles (466 kms) and can be fully recharged in 30 minutes.

For consumers, price emerged as the biggest concern (38%) followed by charging time (28%) and then range (20%). Once they have an EV, charging time and range dominate.

Range anxiety

Range anxiety is what EV drivers feel when the battery charge is low and they think that the vehicle has insufficient range to reach the next charge point. If that happens then the vehicle will be stranded and that is not merely very inconvenient, it is potentially dangerous. Typically, the EV drive cannot be disconnected from the motor, which means the vehicle cannot be pushed or towed. Those that have broken down need to be transported with all wheels off the ground, for example on a flatbed vehicle. So, if it runs out of charge in a busy urban location, a narrow road, or on a motorway, it can be hazardous. It is an experience that most EV drivers will be anxious to avoid. Anything that CPOs can do to reduce that anxiety, for example ensuring high uptime for their charging points and providing real time information of their status, will be well-received by EV drivers. On the other hand, CPOs that do not do this and have relatively poor uptime for their charging points will inevitably lose market share.

In recognition of this EV driver anxiety, the RAC in UK has already developed a service for its members. The RAC is one of the UK's largest motoring organisations and has around eight million members and commercial fleet customers. It is a single contact point for motorists' needs including home breakdown and roadside rescue. In response to the EV challenge, the RAC has developed a lightweight, mobile charger system that is fitted in specialist patrol vans. This enables patrols to help stranded EV drivers at the roadside with a top-up power boost that is enough to get the vehicle to the nearest charge point. As of Summer 2020, the RAC will have 80 patrol vans across the country fitted with the EV Boost system.

Caburn Telecom

Caburn Telecom, an established mobile virtual network operator (MVNO), has recognised this need for highly reliable connectivity for public charging points. The company provides a full set of wireless communications services but does not own the network infrastructure over which the services are delivered. Instead, Caburn has partnered with leading mobile network operators (MNOs) and currently the company provides resilient multi-network 2G, 3G and 4G coverage in over 200 countries on over 600 networks. This provides Caburn with the opportunity to select the most appropriate network to provide the best coverage for any particular location.

Caburn was founded by a team of experienced global telecoms professionals with a vision to deliver engineered solutions and the highest levels of service to customers for whom mission critical IoT connectivity and control are essential. Applying that vision and expertise to EV charging enables CPOs that employ Caburn's services to play a leading role in what is set to become a huge, profitable market.

Real-time information: a mission-critical resource

Recent legislation and product launches are clear indications that governments and the automotive industry are planning for mass EV adoption. The road to transition is, however, somewhat rocky and there are charging issues that create anxiety and confusion for potential EV owners. Right now the wide disparity between the familiar simplicity of ownership and operation of a conventional vehicle versus an EV represents a barrier to mass adoption. Caburn addresses this issue by eliminating the root cause of much of that uncertainty, by enabling CPOs to provide real-time information to their customers on the availability and status of their charging points.

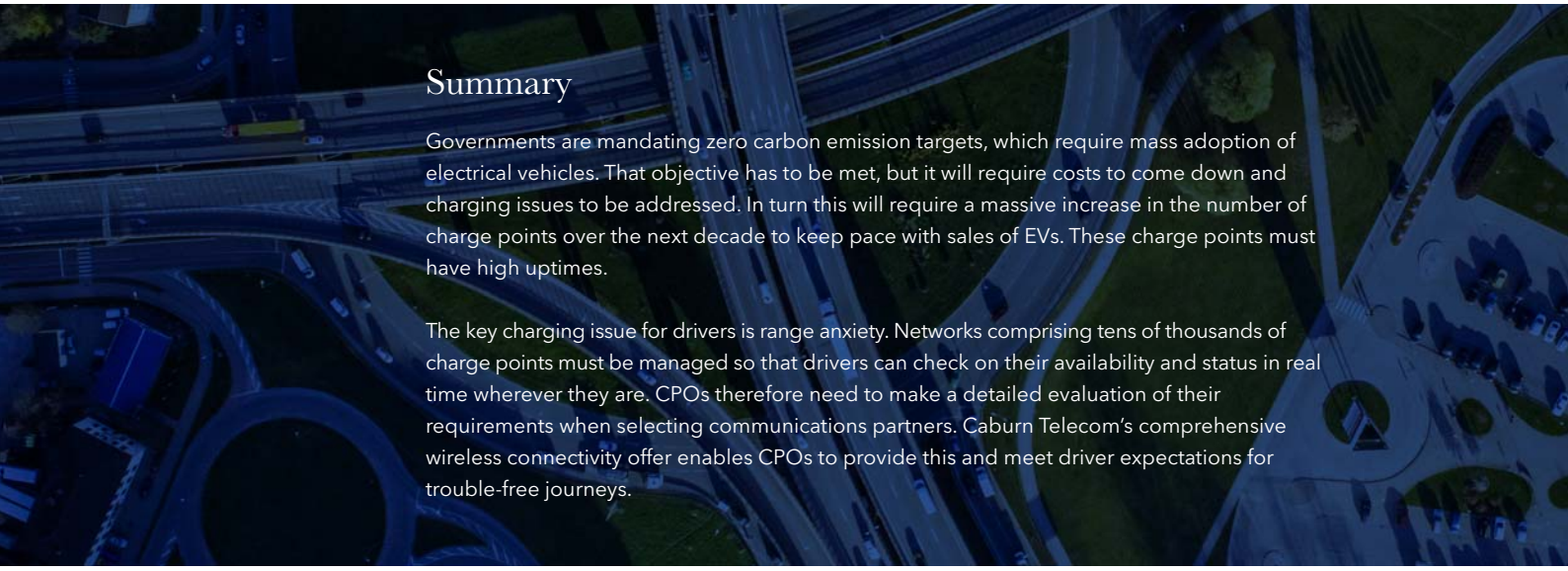
As highlighted earlier, IoT systems acquire data from devices such as charging points and generate real-time information that is communicated to third parties. CPOs, however, cannot simply turn by default to their regular enterprise mobility partner in order to get this information. The operator may have a good IoT offer, but not be an optimum fit in terms of in-country geographical coverage, platform usability and dedicated support focus.

As an MVNO Caburn can provide the requisite coverage but meeting the EV charging challenge involves CPOs partnering with an operator whose multi-network roaming SIM enables non-steered access to multiple networks in each country. Multi-network roaming maximises geographical coverage, connection resilience and streamlines manufacture and distribution with a single stock-keeping unit (SKU). Non-steered access ensures that no network is prioritised and in the event of a connectivity issue the charge points can change between them automatically and with minimal delay.

Extensive SIM Management System

Solutions that enable secure, multi-network connectivity employ remotely provisioned SIMs – termed embedded universal integrated circuit card (eUICC). This type of SIM supports multiple network profiles and can be programmed to change these profiles via an over-the-air (OTA) update.

Caburn Telecom provides a high-level, but simple-to-use SIM management system for this mission-critical resource. It gives CPOs complete oversight of the charge point network from one pane of glass, management by exception, and a comprehensive application programme interface (API) that provides flexibility and the ability to adapt to future market and technical conditions. CPOs can then explore, view, control and manage dispersed populations of SIMs in real-time, via a straightforward interface. The status of groups, devices, their detailed connectivity/traffic records can also be viewed and analysed. Full usage, costs, trends and exceptions are displayed in dashboards and charts. Caburn also provides a powerful set of editable functions and APIs which allow many functions to be automated and linked to business processes.



Summary

Governments are mandating zero carbon emission targets, which require mass adoption of electrical vehicles. That objective has to be met, but it will require costs to come down and charging issues to be addressed. In turn this will require a massive increase in the number of charge points over the next decade to keep pace with sales of EVs. These charge points must have high uptimes.

The key charging issue for drivers is range anxiety. Networks comprising tens of thousands of charge points must be managed so that drivers can check on their availability and status in real time wherever they are. CPOs therefore need to make a detailed evaluation of their requirements when selecting communications partners. Caburn Telecom's comprehensive wireless connectivity offer enables CPOs to provide this and meet driver expectations for trouble-free journeys.