What is Qualcomm Halo™ WEVC technology?
Wireless Electric Vehicle Charging (WEVC) is a convenient solution for charging Electric Vehicles (EV) and Plug-in Hybrid Electric Vehicles (PHEV) without plugging in. Qualcomm Halo™ WEVC technology uses resonant magnetic induction to transfer energy between a ground-based pad and a charging pad on the electric vehicle.

The base pad and the vehicle pad are magnetically coupled, and energy is transferred wirelessly from the base pad, into the vehicle pad, where it is used to charge the vehicle’s batteries.

How is WEVC technology used?
With Qualcomm Halo WEVC technology, drivers simply park in a WEVC-enabled bay, over the base pad, and charging commences automatically. WEVC can also be implemented semi-dynamically, for slow moving vehicles such as taxis queuing in a taxi rank. Ultimately we expect dynamic wireless charging (DEVC) to be built into roads and highways for charging-on-the-move for longer journeys, where greater range is required.

When will Qualcomm Halo WEVC be available?
Qualcomm™ is busy developing the technology for licensing to the automotive supplier network, who will deliver automotive-grade product into the automotive manufacturers. We expect the technology to be available for production by 2016 and would hope to see vehicles increasingly offered by automotive manufacturers soon after. In the short term, we have installed Qualcomm Halo WEVC prototype systems into a number of vehicles for evaluation and assessment by the automotive industry.

What is the efficiency of energy transfer compared with conductive/plug-in charging?
The efficiency of power transfer of Qualcomm Halo WEVC technology is comparable to conductive charging systems used by the auto industry. In general, plug-in charging systems experience the same type of resistive losses within their components, cabling and connectors, as WEVC systems. Qualcomm Halo WEVC technology provides all the benefits of automatic charging with power transfer efficiencies of 90% or more – and that’s including all losses, from grid to battery!
What is the operating frequency?
Resonant magnetic induction can work at a range of frequencies in the Very Low Frequency or Low Frequency bands – typically below 300kHz. However, this band is also used for other services – keyless entry systems and smart grid control, for example. The choice of frequency is therefore of critical importance since wireless charging necessary must coexist with and be non-interfering to other systems which exist both on the vehicle and within our complex electromagnetic ecosystem. Agreeing on a single harmonized frequency will also ensure that equipment from different manufacturers is interoperable, ensuring a buoyant market is created for wireless charging equipment.

Qualcomm Halo WEVC technology operates at 85kHz which we believe is the most optimal frequency technically, from an electromagnetic compatibility (EMC) perspective and for RF coexistence globally.

Is it important for the pad to be perfectly aligned to charge?
With many wireless charging systems alignment is critical to achieve charging, at decent levels of efficiency. The Qualcomm Halo WEVC system is highly tolerant to misalignment (in both X-longitudinal and Y-latitudinal directions) and allows highly efficient power transfer at pragmatic levels of parking misalignment. It is also tolerant in the Z (vertical) direction and can compensate for the different road heights of vehicles.

When was the Qualcomm Halo technology developed?
The Qualcomm Halo WEVC technology has been in development for over two decades, with both Qualcomm and the University of Auckland contributing to the comprehensive technology offering. Historically, wireless power was first demonstrated by Nikola Tesla between 1891 and 1893 and was based on electromagnetic and inductive principles first discovered by André-Marie Ampère in 1826 and Michael Faraday in 1831. It is only in the past 20 years or so that advancements in both power electronics and materials have enabled us to achieve the necessary power levels and energy transfer efficiencies across large air gaps needed for commercial solutions.

Qualcomm Business Model

What does Qualcomm do?
Qualcomm is a technology innovator; we invest heavily in research and development ($4 billion in FY2012) and then commercialize the resulting technology by licensing the intellectual property (IP) across the supply chain.

Over the past 27 years Qualcomm has grown into a multi-billion-dollar global technology company, focusing on a broad range of wireless technologies. The company is the leading producer of silicon chips for the wireless communications industry and has over 240 licensees of its extensive IP portfolio.

What is the Qualcomm business model?
Qualcomm’s business model is best described as horizontal. Instead of making products based on our extensive research and development efforts, as is typical with a vertically integrated manufacturer, Qualcomm licenses its technology to companies that use such technology to commercialize products to meet the needs of their customers.
Compliance

Is Wireless Charging safe?
A number of safety and regulatory compliance criteria need to be met for any WEVC technology to be commercially deployed. Conducted and radiated electromagnetic interference is contained through product design that includes filtering, shielding and the inherent characteristics of the Qualcomm Halo WEVC magnetics.

In addition, foreign object detection (FOD) technology ensures that power transfer is suspended if any object – which could heat up during charging – finds its way onto the base pad, and living object protection (LOP) is a technology that shuts the system down if movement is detected underneath the car, for example if an animal wanders under the vehicle while charging is in progress.

Could the technology impact implantable medical devices?
Pacemakers and other implantable medical devices are currently designed to operate, uninfluenced, up to specified levels of electric and magnetic fields, as defined by standards such as EN 45502-1/EN 45502-2. All commercially deployed WEVC systems must be non-interfering with respect to implantable medical devices and as such any fields generated by the Qualcomm Halo WEVC system are below the specified levels in these standards. Qualcomm’s regulatory compliance engineering team has expertise and experience in assessing interference to implantable medical devices and has defined limits for Qualcomm Halo WEVC technology to ensure non-interference.

Dynamic EV Charging (DEVC)

What is Dynamic EV Charging?
Dynamic Electric Vehicle Charging (DEVC) technology involves charging a vehicle ‘on the move’ using WEVC technology embedded into the roads. Drivers could charge while driving on dedicated DEVC charging lanes, thus removing the need to stop and recharge their EV on longer journeys.

After stationary WEVC deployments, we expect semi-dynamic wireless EV charging will be introduced first to support slow moving vehicles, taxis in taxi queues for instance.

Standardization

Is the industry working to standardize any aspect of the technology?
Qualcomm believes industry standards are essential to unleash the potential of WEVC. Qualcomm is working within various standards development organizations, regulatory groups and EV industry groups, including the Society of Automotive Engineers and IEC, to advance these efforts towards convergence of a truly compatible international standard.

Why is it important for the EV industry to coalesce towards a common WEVC standard?
A single global standard for WEVC will facilitate compliance to regulations, interoperability between equipment from different manufacturers and help create the mass market uptake needed to drive down costs and thereby generate increased consumer demand for the technology.
FIA Formula Electric Championship

What is the FIA Formula E Championship?
Formula E is a new international racing championship featuring Formula cars powered exclusively by electric energy and runs September 2014 through to June 2015.

For the inaugural season, ten teams from around the world, each with two drivers, will go head-to-head for the chance to win a huge prize purse. The goal is to create a new and exciting racing format to appeal to a new generation of racing fans, while also providing a framework for research, development and promotion of electric vehicle technology.

What is Qualcomm’s role in the championship?
Qualcomm is a founding technology partner of the Formula E championship. As a technology partner we will be installing our Qualcomm Halo WEVC technology into FIA Formula E Championship safety cars so they can wirelessly recharge throughout each race.

Qualcomm will also evaluate the connectivity and mobile technology of the ten venue cities around the world, providing solutions to help enhance the spectator experience.

Why is Qualcomm sponsoring the championship?
At Qualcomm, our mission is to continually push the boundaries of what’s possible with technology – through innovations in wireless technology, and through our efforts to do business more responsibly and sustainably.