How Wireless Charging will Shape the Future of Connectivity

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As we move at pace toward an ever more connected world, Near Field Communication (NFC) technology is playing a pivotal role in enhancing the interoperability and utility of devices. First coming to market as an efficient and secure data transfer protocol, NFC has continued to evolve into an enduring disruptive technology that facilitates a host of use cases across a plethora of verticals. From payments to smart homes, NFC's simple tap-and-go operation is revolutionizing how we live our everyday lives.

And yet many of these connected devices face the same fundamental need to be powered in some way. Some devices need a constant flow of electricity, while other devices, especially those that are remote and resource-constrained, require long-life batteries. Meeting the unique charging needs of a device is a central part of effective, ergonomic product design. However, in an era with more and more devices that need to be charged, the question is being asked if traditional methods of providing this are still viable and sustainable.

If NFC has already revolutionized how we use our devices, can it revolutionize how we charge them? Product managers must consider why this technology is continuing to grow with such momentum, how it can address challenges across IoT that other wireless charging standards can't, and what additional value it can unlock for the whole connected device ecosystem.

Charging Without the Cables

Wireless charging allows for the transfer of electrical energy from a source to a device without the need for a connecting cable, plug socket, proprietary adapter, extension, or other complex charging mechanism. There have been a number of attempts to create enduring wireless charging solutions, but they have often been fragmented or lacking the required functionality. Only two mainstreamindustry standards have emerged: the Wireless Power Consortium's Qi standard and the NFC Forum Wireless Charging Specification.

Qi delivers up to 15W over a distance of 4cm via an induction coil, which makes it ideal for delivering rapid charge to mid-size devices such as smartphones and tablets. NFC Forum Wireless Charging is complimentary to Qi, delivering the same intuitive charging experience but for smaller devices. It transfers 1W over a certified compliant distance of up to 5mm, making it a more appropriate wireless

charging option for devices such as wireless earbuds, smartwatches, digital styluses, headsets, and fitness trackers.

Another distinction between these two leading standards is the size and shape of the hardware required. Qi uses a coil-shaped transmitter with a recommended diameter of 30mm. Meanwhile, an NFC antenna can be made with a total surface area as small as 3x3mm. For product managers focused on the size and aesthetics of their products, this can be a crucial differentiator.

Optimizing Power Sharing

While many devices have internal batteries to store charge, for others it is simply not practical or economically viable for them to store their own power. In such use cases, an NFC Forum Wireless Charging compliant power harvesting chip can be built into the design of new products to "harvest" power from another NFC device – such as the mobile phone you already own.

The simplest example of NFC Forum power harvesting is something most of us already do every day – make a contactless payment with a card. When you tap your card on the payment terminal, the payment terminal uses NFC technology to power up the embedded chip and then transfer data between the card and the payment terminal. Of course, your payment card does not have a battery; it harvests power over an NFC connection. This not only makes cards far cheaper to produce as they do not need a battery, but it also makes them more convenient for users who do not need to charge their cards.

And this functionality goes well beyond just payments and smartcards. NFC-enabled padlocks, for example, can operate without a battery by harvesting power from the user's smartphone. This means that the key to the lock can be securely stored locally on the user's own device, and the padlock itself does not need its own power supply or battery. It opens only when it is within range of the NFC- enabled smartphone that also has the right key. This not only makes it power-efficient but also enhances its security.

In addition to the clear cost and practicality benefits, NFC power harvesting also helps "dematerialize" the connected device ecosystem. Dematerialization is the practice of reducing the volume of materials used and, by extension, waste generated in the production of an object or outcome. It is part of the wider industrial ecology approach to material flow management which aims to reduce the environmental impact a business has.

Charging devices and batteries are often made from materials such as zinc, lithium, or potassium, the extraction of which can have a lasting and damaging impact on the environment. By creating solutions that can borrow the power of another device, the volume of these resources that need to be extracted is significantly reduced, thereby contributing to a more sustainable future for the connected device ecosystem.

Advancing NFC Standards

NFC technology is already proven as one of the most versatile and secure technologies available, with use cases across payments, smart mobility, identity, and more. A large number of users are already familiar and comfortable with the NFC functionality of their smartphones thanks to these use cases, and so unlike some of the alternative wireless charging offers, the implementation of NFC Wireless Charging can be seamless with little to no user education needed. This means that its deployment can be rapid and cost-effective.

NFC also gives product managers unparalleled flexibility in their designs. Alongside the well- established

functionalities of NFC, future innovative proposals such as tap to mobile (SoftPOS) payments and multi-purpose tap functionality look set to add even more to the NFC ecosystem. Creating devices that can engage with connected devices like never before is crucial. This will also help drive sustainable, environmentally friendly practices within the circular economy by enabling all connected devices to share data through schemes such as the Digital Product Passport, while also helping dematerialize the ecosystem as fewer batteries and chargers need to be manufactured.

Reaching its Full Potential

Each use case for NFC Wireless Charging brings with it unique requirements, opportunities, and challenges. However, despite these differences, end users will still expect the same seamless, intuitive wireless charging experience. It is therefore crucial to have a reliable baseline that can be implemented by different solution providers to ensure reliability and enable worldwide interoperability between devices.

Trust and consistency between manufacturers and solution providers looking to utilize NFC Wireless Charging is therefore fundamental to its success. The key to achieving this is certification.

The NFC Forum's NFC Wireless Charging certification program — Test Release 13.1 (TR13.1) — allows manufacturers to certify that their products comply with the NFC Wireless Charging (WLC) 2.0 specification. This assures consumers that products will work as promised and are interoperable with other certified devices, significantly reducing the risk for manufacturers.

This onus on certification and interoperability is only further enhanced by the impending dawn of the next generation of NFC. The promise of combining and delivering a number of NFC functionalities simultaneously through multi-purpose tap has the potential to revolutionize how connected devices interact, and keeping each of these sufficiently charged will be at the heart of conversations.

Meanwhile, proposals to increase power output of NFC Wireless Charging from 1W to 3W have the potential to unlock a raft of new use cases, particularly within the enterprise market. This future for NFC technology is the result of consistent and mutually beneficial industry collaboration between multiple competing stakeholders. As an active technical community of more than 500 member organizations, NFC Forum brings these competitors together to evaluate the long-term needs of the market to enhance connections and capabilities within existing systems and support exciting new innovative use cases that have significant mass market potential.

NFC Forum is driven by its Board - which includes Apple, Google, Huawei, Identiv, Infineon, NXP, Qualcomm, Sony, and STMicroelectronics.

To learn more about the future of NFC, watch the Forum's Technology Roadmap Webinar.