Wireless Power: One Futuristic Technology Energizing Smart Cities

sealevel.com/2018/09/21/wireless-power-smart-cities

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A mobile device battery has many demands to fill: photos, maps, social media, apps and ride hailing services, etc. These demands increase at conferences and during travel. Almost inevitably, device batteries drain. One must sit near the wall, pole or wherever, to juice up. That could take an hour… or two. It is, as millennials would say, a huge bummer. However, one exciting technology could eradicate that dead battery stress. It's called wireless power, and it will energize smart cities.

What is Wireless Power?

In this case, wireless power is energy transfer over the air (OTA) using radio frequency (RF) signals. These RF signals carry energy, much like transmitting Wi-Fi signals that hold data. However, when a signal does not carry data, it can transfer energy.

Wireless power transfer is different from mainstream wireless charging, more appropriately called inductive charging. These wireless charging stations rely on electromagnetic induction coils. These coils transmit power to other coils in the device being charged. They require alignment and close contact between station and device. This system requires thermal engineering solutions to manage heat buildup.

True wireless power is over a distance using a transmitter-receiver system on a specific radio frequency. The transmitter sends the energy. Then, the receiver converts the RF signal to DC power. The beams do not pass through obstacles. They bounce off and around, making them safe for populated areas. This method is as efficient as wired or induction power charging.

Who makes Wireless Power?

Currently, there are two major players with market-ready wireless power products. One of them is Energous. It focuses on consumer electronics networks, like smart living rooms. The other is Ossia. This application best suits commercial electronics networks, like coffee shops and airports.

Both companies have emerged in the last year. Each of them relies on a different RF channel. Energous uses the 900MHz frequency on their WattUp transmitters. Ossia uses the 2.4GHz spectrum for its "Cota" standard.

How does Wireless Power Work?

Energous has different requirements for transmission, dependent on distance. It

functions up to 15 feet away. For objects “mid-field” to “far-field,” Energous uses beamforming. This process sends energy beams directly to a receiver from the WattUp transmitter. It is a software-managed system. It checks for Bluetooth devices to charge, their distance and their network authorization. In other words, the transmitter will not waste its energy trying to charge every electronic device in the room.

In contrast, Ossia’s receivers send a low-power beacon signal first. Then the Cota Power Transmitter sends its energy along that signal pathway. From there, the process is the same: the receiver converts the RF to DC power. Multiple devices can signal at once and have RF beams directed at them specifically and simultaneously. Cota products have receiver chips, batteries or other power storage devices installed to send out these signals, convert the energy to power and store it.

In both instances, the charging device can move around the room. Its path of reception will adjust with it. However, in both instances, applicable devices must be relatively low-power, and charging times are slow. The charging, though slow, is continuous.

Smart Cities and Wireless Power

The most appealing use of wireless power is in smart cities, especially those connected to the Internet of Things (IoT) using 5G technology. These entities rely on a vast system of software, sensors, AI-enhanced robots and IoT devices to automate city tasks. The above systems require varying amounts of power. Devices like IoT require more power and continuously. OTA wireless power would ensure that none of these devices ever turn off.

Example: a smart city with wireless power

For instance, consider the setting of a busy street intersection. It is alongside a riverfront park. Tourists and locals spend time at the park, taking photos and getting work done. The intersection experiences traffic often, with various incidences. Students use laptops at table sets. Others use e-readers, tablets and smart watches. Almost everyone has a smartphone on them.

Additionally, the city has a few IoT devices in range. The IIoT-enabled garbage machine sends notifications when reporting an error in operation. The intersection has a voltage monitoring IIoT device that monitors the streetlight’s power. Each park lamp post has an IoT device equipped with acoustic and optical sensors: each can detect a gunshot and notify a hotline or automatically adjust its brightness.

Accordingly, a wireless power ecosystem is in place. Each of these IoT enabled devices is equipped with a receiver. Transmitter stations are located at key locations. They continuously charge the devices in the area, providing those devices have the correct authorization. Individuals can sign-in to the network and charge as well. Outlet structures are no longer required. Individuals work, play, and tour freely. Remote monitoring is constant, and complications or failures are predicted and avoided.

Wireless Power Ecosystem

The amazing part of this technology is its availability right now and its applicability to all environments and edge-based networks. Devices that currently run on standard battery operation and wired charging retrofit easily. The construction of an adapted power ecosystem is the last stem in making the technology ubiquitous.

In short, if smart cities participate in the wirelessly powered IoT ecosystem, the successes will follow shortly. It will increase productivity. Tourists are more likely to be comfortable visiting. Safety costs could be decreased, and safety confidence could also rise.

Sealevel aims for products that are interoperable, durable and reliable. As we roll out more IoT hardware and software, we look forward to making our devices configurable for new waves of technology.

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