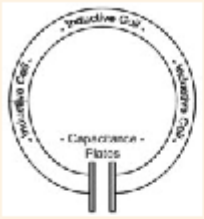
Weird & Wireless: Practical use of wireless power over 10 feet



Welcome again to the wonderful but sometimes weird world of wireless comms, written by Joel Young, CTO of Digi International.

So all of Tesla's work was cool, but how about a practical use of wireless power for say 10 to 20 feet?

Okay - well I acknowledge that, as **cool as Tesla's work was**, it probably isn't very practical in today's world for all of the obvious reasons.

Nonetheless, we can still learn a lot from this work as to how it relates to other wireless power solutions under development today. Unfortunately, while promising experimentally, wide availability of products has not yet been realised, but it is only a matter of time and I'm convinced that we will see easy to use, cost effective, personal area wireless power within the next few years.

But how will it work? Other than solutions like harvesting RF, the cornerstone for practical wireless power is related to some type of inductive coupling.

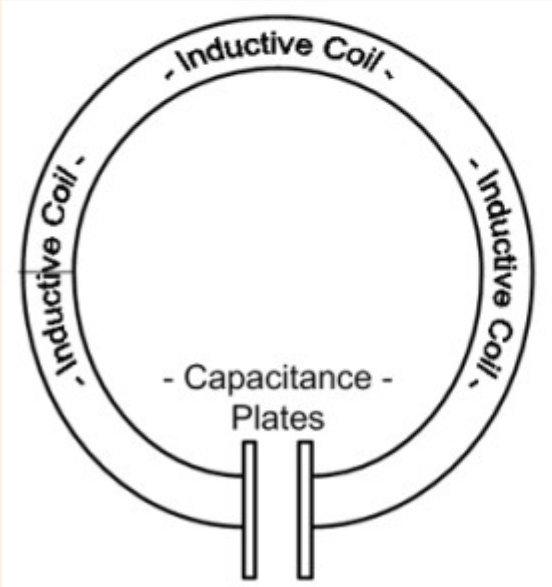
I recognise that some of you physics purists might take exception to my terminology. In any event, the idea is to extend near-field effects over a distance.

In the Tesla solution discussed in the **last post**, the earth was turned into a giant coaxial cable where energy was transferred via magnetic field, guided by the earth's atmosphere acting as a dielectric, thereby extending the distance of inductive coupling.

In my searching, I've come across another approach for extending the reach of inductive coupling to form what I will call personal area wireless power. The most intriguing methods of promise are variants of something called Resonant Induction. This work has been pioneered by some really smart people at MIT as part of the MIT Wireless Power Project. Other work, using slightly different techniques has also been developed at the University of Florida.

The concept is to use resonance to extend the distance and "guide" the magnetic flux. I know this sounds a bit strange and I readily admit that I don't completely understand it completely. But you should think about it in the same way you think about a tuning fork. If you strike a tuning fork, you might not be able to hear the sound of its vibrations over much distance, but another tuning fork that has the same resonant frequency, will easily vibrate over some distance.

Remember that the resonant frequency is the natural frequency of vibration. In the concept of the tuning fork, the sound vibrations appear to "tunnel" between the two forks. To do this electromagnetically, we take a Tesla coil and bend it in a circular shape. Next the really cool part - on the ends, where the Tesla coil would typically touch the ground and the air, capacitance plates are placed so the ends look like a capacitor. See the figure below.



From your old circuit days, you might think of it as creating a sort of LC resonator where the resonant frequency is related to the product of the inductance and capacitance.

Using a high resonant frequency, the magnetic flux appears to be "tunneled" to the receiver as long as the receiver has the same resonant frequency.

Even though we use the term "tunneling" as a metaphor, just like the tuning fork, it appears directionless.

Of course distance is still limited to single digit meters and the amount of power will be limited by emissions constraints.

Finally, for the movie fans out there, I personally notice a resemblance to the "Flux Capacitor" - just imagine what could happen if **Doc Brown put 1.2 Giga-Watts into one**.

--

*Joel Young, VP of Research and Development and CTO at **Digi International**, has more than 22 years of experience in developing and managing data and voice communications. He joined Digi International in June 2000 and in his current role he is responsible for research and development of all of Digi's core products.*

Prior to joining Digi, Joel was VP of Sales & Marketing at Transcrypt International where he was responsible for sales, marketing, and product development for all information security products. During his tenure at Transcrypt, he also served as VP of Product Development and VP of Engineering where he was responsible for engineering, research and product development for wireless communications products, cellular telephony, wireline telephony and land mobile radio, data security and specialized digital radio products.

He also served as District Manager for AT&T Business Communications Services where he was responsible for the creation and implementation of voice processing and network database strategies, including deploying new voice processing platforms into the AT&T switched network for private network and other outbound calling services.