The IoT wars

Most of us are familiar with Bluetooth headphones which we use with our cellular devices. While the communication between the Bluetooth device and the cellular device is limited to a few feet, it is the cellular device, in turn, that maintains the connection with the long-range telecommunications network.

These “last mile”—or more accurately, “last feet” radio devices need to be charged frequently, since the radio in each device needs a considerable amount of power in order to be able to transmit and receive information at a respectable range. The trade-off that designers of these devices have always faced is been between battery life and device range. The longer the range you want, the more power your device needs—and the more frequently it needs to be recharged.

If the Internet of Things or IoT is to be useful, then IoT devices need to have the ability to communicate with each other over long distances. When this long-range communication variable is thrown into the equation, the only way is for firms to limit the battery-constrained radio communication to short distances and then switch over to the capabilities of cellular providers, on whose network they can piggy-back to send data over long distances.

Many potentially “connected things” are located in remote areas at long distances from the nearest cellular base station, or deep within buildings, which shield them from a cellular signal. Yet others are constantly on the move—being shipped from factory to consumer in a long supply chain, for instance. While en route, coverage is spotty and requires the device to operate at high power, thereby draining the battery.

In addition, the type of cellular network over which machine-to-machine communications are carried also makes a difference. The old 2G or GPRS networks were ideal for the very low levels of data transmission that IoT-enabled devices need—often not more than just a few packets (or bytes) of data each day. In fact, 2G or GPRS networks are responsible for most of today’s machine-to-machine communication.

However, 2G, while sufficient for machine-to-machine communication, simply doesn’t cut it for the vast majority of human smartphone users. 2G networks are beginning to be shut down as the world has moved on to 3G, 4G and LTE networks as cellular companies fight to serve billions of smartphone users who demand vast amounts of data throughput. LTE build-outs continue apace, as we have recently seen in India with Reliance Jio.

These new cellular networks are not yet optimized for applications that only transmit small amounts of infrequent data. In the rush for greater data throughput for smartphones, the 3rd Generation Partnership Project or 3GPP, the international body that sets cellular standards, was slow to set out “Narrowband IoT” standards meant for machine-to-machine communications for newer cellular networks like 3G, 4G and LTE.

Interestingly, the slow death of 2G and the delay of standards for deploying IoT over newer cellular networks has contributed to a welcome development. Scientists have worked on a new class of radios that would allow IoT devices to communicate over larger distances. These radio devices deliver both long-range communications and years of battery life. A set of technologies collectively called the “Low Power Wide Area Network” or LPWAN have been promulgated by firms such as SigFox, Ingenu, and LoRa as an alternative to the delayed Narrowband IoT from 3GPP.

That said, 3GPP and telecom providers now have solutions for IoT on the newer LTE networks, called LTE-M (where M stands for Machine). Even here they haven’t been specific, since there are two competing Narrowband IoT standards, one backed by Nokia and Ericsson and the other by Vodafone and Huawei. This further leads to a delay in adoption, which will allow the LPWAN device makers more time to seize the market.

The leaders in the LPWAN space appear to be SigFox and LoRa, which are both well-funded French firms producing devices meant for IoT communications. Their batteries last for years while emitting or receiving a usable signal. I shall not go into the competing technologies in any depth here. Suffice to say that the underlying radio technology that the firms are using has been around for a while but what's new is that it has now been encoded to microchips which can be cheaply produced at a large scale. One can now buy a long-range radio chip for pennies and add it to any device.

The main difference between SigFox and LoRa is that SigFox is both a device manufacturer and a network operator. SigFox licenses out its device technology, so any manufacturer can make use of the technology, but the user is constrained to the proprietary SigFox network. With LoRa, there is only one chip manufacturer, so you pay for the chip, but can install it without recurring costs if, like many communications companies, you already control a network. For instance, Tata Communications already has a tie up with LoRa to offer IoT solutions.

One way to make sense of these divergent business models is to think of the differences between Apple and Google in the smartphone arena. Apple has always maintained control over both the device and the software, while Google licensed out its Android software to a plethora of manufacturers.

Google has recently seen the light of being both a device manufacturer as well as an operating software provider, while Apple hasn't yet let go of its proprietorship of both hardware and software. The battle for LPWAN device supremacy will see similar twists and turns.

And yes, like the smartphone space, the Chinese are hovering over all of this. Huawei is pushing one of the two standards for the alternative technology of LTE-M. Considering that they own a chip manufacturer in HiSilicon and probably can get the Chinese government to deploy millions of devices in China, they may create the eventual de facto standard. Maybe an Indian IT major should acquire an LPWAN player to thwart this.

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