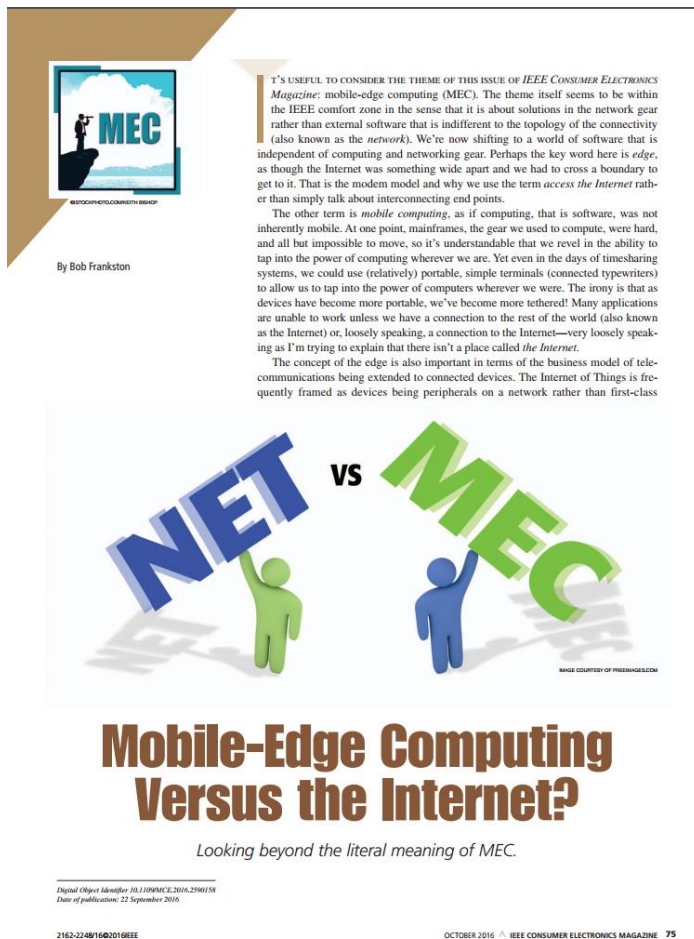


Mobile Edge Computing vs. The Internet?

Online Version

The final version formatted for the magazine on the IEEE site is available [here](#).



IT'S USEFUL TO CONSIDER THE THEME OF THIS ISSUE OF *IEEE CONSUMER ELECTRONICS MAGAZINE*: mobile-edge computing (MEC). The theme itself seems to be within the IEEE comfort zone in the sense that it is about solutions in the network gear rather than external software that is indifferent to the topology of the connectivity (also known as the *network*). We're now shifting to a world of software that is independent of computing and networking gear. Perhaps the key word here is *edge*, as though the Internet was something wide apart and we had to cross a boundary to get to it. That is the modem model and why we use the term *access the Internet* rather than simply talk about interconnecting end points.

The other term is *mobile computing*, as if computing, that is software, was not inherently mobile. At one point, mainframes, the gear we used to compute, were hard, and all but impossible to move, so it's understandable that we revel in the ability to tap into the power of computing wherever we are. Yet even in the days of timesharing systems, we could use (relatively) portable, simple terminals (connected typewriters) to allow us to tap into the power of computers wherever we were. The irony is that as devices have become more portable, we've become more tethered! Many applications are unable to work unless we have a connection to the rest of the world (also known as the Internet) or, loosely speaking, a connection to the Internet—very loosely speaking as I'm trying to explain that there isn't a place called *the Internet*.

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The concept of the edge is also important in terms of the business model of telecommunications being extended to connected devices. The Internet of Things is frequently framed in terms of devices being peripherals on a network rather than first class computing devices.

The devices are often seen as dumb sensors or indicators whose intelligence lies in the network. Hence the need to interconnect. The opportunity then exists to make money by servicing those devices. Today computation is readily available so that just about any device has sufficient computing for simple peer connectivity.

We need to think about devices as first class entities with relationships that are independent of an edge. Additionally, we need to think about business models that don't depend on an entity in the center of a network in order to capture the value.

Interconnecting

MEC emphasizes the mechanics of the interconnecting of computing devices. This was important back when devices couldn't do local computation or now, when we are very concerned about battery life or other constraints.

However, those concerns come at a price of complexity and interdependence among system elements that make it difficult to evolve and take advantage of unanticipated opportunities.

Imagine if we didn't have to think about the mechanics of interconnecting and weren't limited by a service provider which makes money on the edge devices. Here I'm using

the term “edge device” to mean a device that can operate independently rather than being nodes on a networks.

This is not a new idea. The 1970’s effort to interconnect collections of devices was successful because it totally decoupled the relationship between the end points and the mechanics of connectivity. This decoupling was a pragmatic solution. Given the disparate needs of the end points, the best engineering solution was to accept that one couldn’t solve application problems in the transport.

The approach was called internetworking because it was considered simply an evolution of traditional networking. Even today this effort, abbreviated to “the Internet”, is framed in terms of traditional networking. Communications engineers keep trying to solve application problems inside the network and telecommunications providers continue to try to create value in the network.

Local Connectivity (or Edge Computing) is framed in terms of use cases. Bluetooth being such a case in point. Not only is it tightly coupled to particular applications (profiles), but it doesn’t internetwork! The application must be paired with a particular device and there must be a corresponding application to pass the message along.

The newer Thread protocol is an improvement but topology of a local security perimeter is part of the architecture.

Wi-Fi, which has been a great successor and enabler, uses a hub and spoke model for connectivity in access point mode. It’s not too difficult to hop from one access point to another, at least when there isn’t a security perimeter that interferes with the relationship between the end points.

Edgeless Connectivity

It’s easy to think of the Internet as a traditional network. We can examine the gear and the protocols up close in the same way we might look at the phone network’s SS7 protocol, adopted in the 1970s. That can be very useful to understand where we are and how we got here. But the future isn’t just a forward projection of that past,

The Internet’s power comes from the whole – the way we can use existing gear and technologies without being limited by a provider’s purpose. It’s important to recognize the new opportunities created in looking at the familiar with a fresh perspective. As the World Wide Web, or today simple the web, drove adoption of the Internet we discovered the possibilities of social networking and the power of implementing technologies such as VoIP outside of the confines of a network.

Ethernet is a good example – technically it’s just a coaxial cable. But it is clever software on the external devices that make it a network and, if we use the appropriate software, it enables us to internetwork. The term “Internet” is merely a shorthand for a particular set of protocols we use for internetworking, while the underlying concepts are important beyond a narrow definition of the Internet.

From the perspective of the software developer, local networks are edgeless. One just focuses on the other end point. In this sense the Internet allows us to ignore the edge and focus on relationships.

This is why many people think of the Internet in terms of the societal and social implications as we ignore the new relationships between people. For that matter we can think of people connecting with each other as social networking.

We do need to be careful about the analogies we use but we can also be informed by them. The Internet is more like a social network than traditional telecommunications because we take responsibility for our relationships. We do so rather than having them provided by an operator or other matchmaker. The relationships exist apart from any intermediary.

For MEC this means that the focus should be on enabling relationships between any two end points by providing packet connectivity locally (AKA, at the edge) and not just across the backbone. Today the access points tend to act as hubs for separate networks. At a pragmatic level if I want to print I shouldn’t have to make sure I’m connected to the same access point to use a given printer. Reaching a printer on another network means going across a boundary to reach the other network. Edgeless connectivity makes the devices easily accessible. Technically we can think of this as a flat address space.

This also means we should have the same resiliency for local connectivity as we have for the backbone rather than depending on all hubs and switches working correctly. Having redundant paths and being able to use wireless and wired links would contribute to resilient connectivity.

Applications

Once we can assume connectivity independent of any edge we can focus on how applications connect. But that’s for another column.

For now, we need to be look beyond the literal meaning of Mobile Edge Computing and look at the technology in the light of how to enable end points to connect locally rather than seeing value only in terms of connecting or access to a far off Internet.

