

Exploring Edge Computing

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Much of the data center industry is in the midst of “mega” consolidation of their data centers. But, one could argue they are moving in the wrong direction. Data analytics and knowledge generation at the source of data, otherwise known as edge computing, is the next frontier. It stands to disrupt the current trend of centralized computing and consolidation of data centers.

As the term implies, edge computing shifts the “computing” functions to the edge of the telecommunications and IT networks. It covers a wide range of technologies including:

- Mobile technologies like mobile edge computing, cloud-based radio access, mobile data acquisition, and mobile signature analysis;
- Wireless sensor networks;
- Fog computing;
- Distributed data storage and retrieval;
- Remote cloud services; and
- Augmented reality.

The edge computing trend is being fueled by many other important trends, including the explosion of edge devices or sensors (Internet of Things), analytics of consumer data as sources of targeted advertising, and limitations on network bandwidths.

This column briefly introduces the concept of edge computing, some of its key drivers, and what it means to data center consultants.

Centralized Computing

Today’s data center and telecommunication models are “centered” on the theme of centralization. Internet data centers lead the “mega” theme with campuses that span hundreds of acres and consume tens of megawatts of power.

Currently, many federal and enterprise data centers are in the midst of consolidation efforts driven by cost savings. The cost savings is delivered through consolidation of hardware, software, and points of presence, each of which requires expensive telecom facilities, operators, physical security, cybersecurity, etc.

Centralized storage creates an easy means of

regulatory compliance and management of data integrity against cybersecurity threats (points of intrusion). It also enables centralized computing and analytics of a larger data structure over greater periods of time.

It is true that strong arguments exist for centralized computing and data storage, yet distributed edge computing is emerging as a better means of managing the growing number of connections, data development, and data analysis as networks of all types are stretched to their capacities.

Edge Computing

In the past, data centers were used primarily to support internal functions. Now, they are being used to support end-user applications and content. Companies are shifting to obtain more revenue from those applications and content through advertising, in particular, targeted advertising.

Targeted advertising requires insights about the consumer, especially local consumers. In the local context there is a decreasing value for centralization of data storage and analytics. In addition, advertising is shifting toward more real-time focus.

Edge computing essentially moves the “brains” of computing where less data needs to be moved across telecommunication networks or internet service provider (ISP) networks. ISPs and telecom providers are increasingly under pressure to expand the capacity of their networks to manage the exponential growth in data demands. One way to solve this problem is to build applications and software solutions with edge

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computing capabilities to reduce the amount of network traffic.

Perhaps one of the best examples of edge computing is the smart phone in the palm of your hand. The computing power is some 50 times greater in today's smart phones than when originally released. It's also predicted that smart phones and tablets could become your only computer in as little as two or three years. This trend has already occurred for many, as seen by the rapid declines in the personal computing (PC) market. The smart phone is one example of the mobile edge computing (MEC) trend.

Mobile Edge Computing (MEC)

For years telecom networks have operated with hardware-centric, radio-access network (RAN) at their macro-cellular sites (cell sites for short). This model was largely dependent and limited by the hardware, yet it was viewed as highly scalable through the multiplication of the number of access points or locations.

The IT industry demonstrated ways of creating agnostic hardware with virtualized software, which they were able to use to scale orders of magnitude faster than any telecom network has ever done. Today the telecommunications industry is following suit with cloud-based radio-access networks (C-RANs).

This new network architecture holds the promise of being more cost-effective to build and operate. The two largest costs are telecommunications links (backhaul charges) and the RAN hardware/software, which is largely proprietary. Through consolidation of edge traffic at fewer locations, backhaul (telecom) costs can be reduced.

In addition, through open and standardized industry hardware platforms, the costs to purchase and deploy their network edge significantly decreases. Many industry studies have been conducted to conclude that the total cost of ownership for C-RAN will prove to be less expensive than the current models for RAN networks.

The future C-RAN should provide mobile broadband Internet access to wireless customers with lower cost and better performance. Centralized signal processing at the edge greatly reduces the number of sites and network equipment room needed to cover the same areas. This is a paradigm shift to move the "brains" of the

network toward the edge; in other words, centralize the computing at the edge.

Agility in Design

Edge computing translates into more agility for future data center growth. More and more companies are now beginning to realize the potential competitive advantage obtained through increased use of edge-computing strategies. They are also beginning to realize significant cost savings are available through a divergence from centralized data management.

For data center consultants, this means looking at future-proofing concepts with more dimensions. Those dimensions need to no longer only consider increased capacity but the higher potential of stranded assets and/or the need for more dynamic exit strategies.

Today's designs are primarily singularly focused on future increases in loads and space needs. However, as we've seen with the introduction of virtualization, some disruptions can result in the reverse trend. Edge computing is another such trend that aims to diversify the data center across more assets in smaller segments.

Final Thoughts

Edge computing has emerged as both a solution and necessity to the growing data demands of the Internet of Things (IoT) and consumers.

Centralized computing is now under pressure to shift to the edge as the result of many trends and factors. The rise of the IoT means millions more connected devices, each with computing and data throughput needs.

A link exists between virtualization, IoT, cloud, software defined networks (SDN), and edge computing. While SDN is focused on data centers and the core network, over time there is potential for the principles of rapid and automated reconfiguration of network resources to be applied more widely and closer to the edge. A distributed computing resource would become part of this paradigm.

The centralized model meant that data center consultants had a single large, predictable target to focus on. Edge computing changes the game entirely and distributes the data center everywhere and anywhere. The definition of the data center will need revisiting as its location, size, and loads will no longer be as predictable. ■