

APPLICATION NOTE - EDGE COMPUTING

OVERVIEW

With the ongoing advancements in digitalization and automation, the intense growth of computing power is more imminent in today's world than ever before. As time progresses, the large amounts of data volume from Internet of Things (IoT) edge devices will only be compounded by the wider deployment of 5G networks as more IoT devices go online and more data is stored in the cloud for analysis.

Historically and still relevant today, cloud architecture enables automation and data storage. Most business enterprises (IT) have adopted this model to capture their data using cloud service infrastructure such as Google, Microsoft, and Amazon Cloud. While cloud architecture continues to play an important role in the IT enterprise side of the business, it does not translate well in the Operations Technology (OT) space.

Mission critical applications such as power utilities, oil & gas, nuclear plants, water & wastewater, and transportation markets etc., typically have field assets that fall under OT. These field devices are mainly responsible for process and control functions in the field such as Machine to Machine (M2M) communications. Since the field devices are responsible for critical services, a more stringent way to manage data would be better done locally, at the edge of their premises. This is where edge computing would provide benefits.

What is edge computing?

Simply put, edge computing allows for computations and "limited data" storage closer to devices than a centralized location which is geographically further from the source of where the data originates. It was developed due to the explosive growth of IoT devices that connect to the internet and sends and receives data to and from the cloud.

Why edge computing?

Since Industrial markets (OT Applications) must deal with stringent environmental conditions, traditional PCs would not survive in the field. For example, a substation environment would cause severe damage to commercial PC's that need to contend with humidity, condensation, extreme temperatures, and electrical magnetic fields (EMI). They would simply fail in a short period. The solution would be to utilize an Industrial grade PC. This is where edge computing benefits industrial environments.

Modern automation software and data architectures drive the demand for scalability, flexibility, and ease of use management. iS5Com's RAPTOR is a multi services platform that enables L2/L3 ethernet communications, network security and running additional applications with the use of the iROC module (industrial grade PC) while exceeding the demands of harsh environments. This combination allows users to take advantage of edge computing to capture and analyze data for real-time and predictive maintenance.

Edge computing offers key benefits such as:

1. Lower latency
2. Reduce bandwidth utilization.
3. Improved security
4. Real-time of data analysis
5. Scalability

Lower Latency

Since the computing power will be closer to the edge devices, this greatly improves the speed at which data can be analyzed by the user. In turn, this reduces any network latency as some data can be stored in the RAPTOR. Going over the WAN causes higher latency as you account for other physical connections such as the length of cables and distance to the cloud location.

Reduce Bandwidth Utilization

Since the data is stored locally, it will not need to contend with traversing over a WAN back to the cloud or a data center thus, reducing the bandwidth. Edge computing allows data to be processed near the source, i.e. Industrial Internet of Things (IIoT) devices such as sensors or controllers.

Improved Security

Since traditional cloud computing is prone to attacks such as distributed denial of service (DDoS) and power outages, cloud architecture is typically centralized, allowing any single disruption to take down the entire network. In contrast, edge computing is distributed across a wide range of devices and applications that can be segmented from other parts of the network.

Real-time data analysis

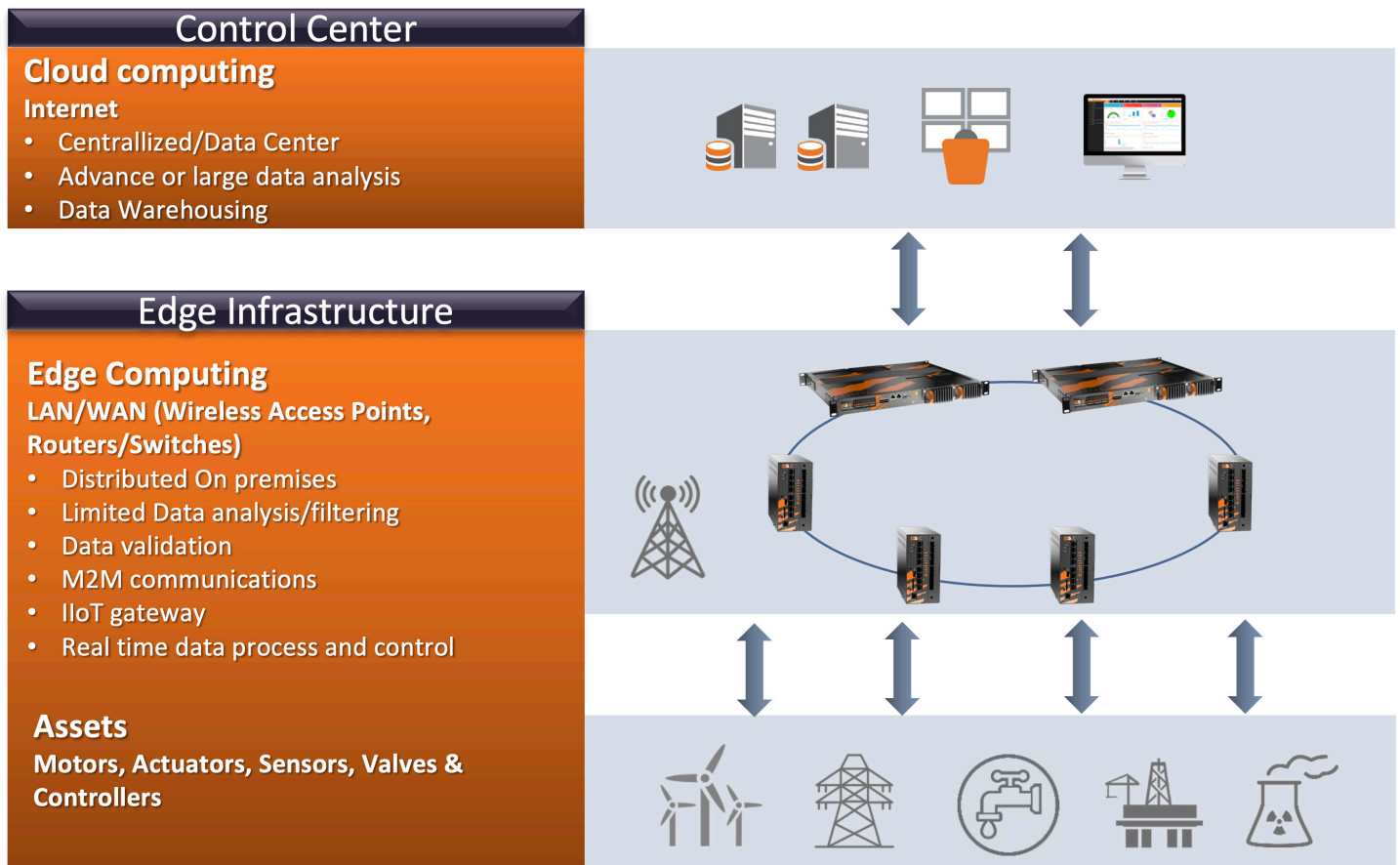
Real-time data analytics is crucial for mission critical applications as the services provided generally have significant impacts on the operations of the field network. In the case of power utility outages, ensuring that data is received as events occur within the network, allows the user to identify issues quickly and provide predictive maintenance to mitigate outages.

Scalability

Edge computing can take full advantage of a robust architecture when networks scale. With the expansion of field networks, it can account for greater volumes of data and applications.

Edge computing also provides industrial users with the flexibility for scaling their growing needs.

Figure 1 - Edge Computing Topology



Do I need cloud for my industrial environment?

Industrial applications need to utilize a hybrid of cloud and edge computing. It is not recommended to use only cloud for sending and receiving information. The cloud can be utilized for data warehousing and deeper data analytics to understand behaviour and trends overall. Edge computing can provide the enhancement to improve the operational efficiency of your network by localizing specific data.

CONCLUSION

In retrospect, edge computing provides significant benefits for industrial applications as this trend continues. With network infrastructure devices proving to be smarter, it is beneficial to combine the benefits of a singular platform such as RAPTOR with functions of L2/L3 communications, Network Security integration, and a hardened PC capable of running third party software applications and localized data storage. The RAPTOR can be used as the secure IIoT gateway and act as a junction between the WAN and LAN at the edge. This will enable users to realize the benefits such as:

- Reduce procurement costs
- Improved asset downtime and performance
- Simpler data processing at the edge
- Meeting the demand for computing power
- Flexibility and functionality
- End users looking for open, non-proprietary solutions
- Simplified management

ABOUT iS5 COMMUNICATIONS INC.

iS5 Communications Inc. ("iS5Com") is a global provider of integrated services and solutions, and manufacturer of intelligent Industrial Ethernet products. Our products are designed to meet the stringent demand requirements of utility sub-stations, roadside transportation, rail, and industrial applications. iS5Com's services and products are key enablers of advanced technology implementation such as the Smart Grid, Intelligent Transportation Systems, Intelligent Oil Field, and Internet of Things. All products have the ability to transmit data efficiently without the loss of any packets under harsh environments and EMI conditions.



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