
KIO Networks®
EDGE DATA CENTERS
YOUR DATA,
CLOSER.

EDGE COMPUTING

YOUR BUSINESS, CLOSER TO YOUR CLIENTS.

Today, a more decentralized approach is required to address the infrastructure requirements of digital business since, as the volume and velocity of data increases, so does the inefficiency of transmitting all this information to a centralized Data Center or Cloud infrastructure for processing.

Richard Villars, Vice President of Datacenter and Cloud research at IDC, is confident that any edge-related conversation must start with the 31 billion things that IDC believes will be connected worldwide by 2021. The importance of the 39,000 central Data Centers (enterprise, colocation, and Cloud), where deep analysis and long-term data storage will be consolidated and carried out, must also be recognized.[1]

Meanwhile, Gartner points out that the decades-long switching between centralized and decentralized computing models will cease in the immediate future because opportunities for entirely new applications drive distributed computing. In other words, we spent the last few years building a one-way highway (the Cloud), and now it is essential to shift to the side where the data is generated.[2]

[1] IDC. (2019). Scale is the secret when it comes to the edge.
[2] Gartner. (2018). The edge completes the cloud.

2020 will be a pivotal year for Edge Computing. New form factors, partnering strategies, and the promise of 5G will all converge so that next year will bring its ultimate take-off, powered by large enterprises' computing needs".[3]

Forrester

THE ROAD OF EVOLUTION

In the past, the promise was that Artificial Intelligence (AI) taken to the Cloud would bring automation and accelerate innovation by generating actionable data from captured information. However, very few foresaw that the number of connected devices would exceed the capabilities of centralized Data Centers or the Cloud, and this would cause bandwidth and latency problems.

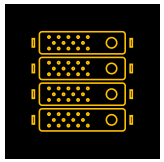
On the other hand, emerging technologies such as deep learning and neural networks have revolutionary potential.

But they are hampered by heavy runtimes and massive power requirements.

This is the context in which Edge computing emerges, which offers a more efficient alternative: data is processed closer to the point where it is created, allowing a faster and more complete analysis, providing the opportunity for deeper insights, shorter response times, and better customer experiences.

TOPOLOGY OF CORPORATE NETWORKS[4]

Top three places where businesses tend to deploy and manage their applications and services:



Facilities: Data Centers house multiple server racks, equipped with the necessary resources to power and cool them, as well as dedicated connectivity to external resources.

Colocation facilities: the client's equipment is housed in a fully managed building where power, cooling, and connectivity are provided as services.

Cloud service providers: the client's infrastructure can be virtualized to a certain extent, and services and applications are provided on a per-user basis. This allows operations to be accounted for as operating expenses rather than capital expenditures.

Edge computing architects are looking to add their design as a fourth category on this list: leverage the portability of micro Data Centers and small servers and reduce the distances between the processing point and the point of functionality consumption in the network.

[3] Forrester. (2019). Predictions 2020: Edge Computing.
[4] ZDNet. 2019. Where the Edge is in Edge computing why it matters and how we use it.

Basically, it's about bringing intelligence closer to where it's needed. So that one day, your smartwatch will recognize that you need to cross a street and activate the pedestrian signal for you, but this will only be possible if your smartwatch and the transit system can communicate directly with each other, avoiding latency.

This will become a reality because it has already been understood that the distance between the centralized Data Center, the sensors, and other devices at the Edge is not a straight line but are on a multi-tiered integrated ecosystem of regional Data Centers, micro Data Centers, cloudlets, Edge servers, personal assistants, and artificial intelligence.

EDGE COMPUTING DICTIONARY[5]

Edge: this definition depends on its usage or the sector itself. In the telecommunications field, it can consist of cell phones and the antennas themselves. In the automotive industry, it can be a connected vehicle. In manufacturing, it can be made up of intelligent robots, and in a multinational company, it can even be a laptop computer.

Edge devices: from IoT sensors to industrial machinery or other equipment that produce data.

Edge gateway: the gateway where processed data from the Edge and the broader network (fog network) is separated and subsequently distributed.

[5] MCPRO. (2019). Edge Computing: casi todo lo que tienes que saber.

«Thick» client: software capable of processing data on Edge devices. It is not the same as the "thin" client responsible for transmitting data.

Edge Computing Equipment: consists of devices, sensors, industrial machines, among others, that can be part of an edge network by simply connecting them to the internet.

On the other hand, many manufacturers market devices and computer equipment that are specially designed for

the Edge, from small servers to hyper-converged systems and specific storage solutions, includes AWS Snowball.

Mobile edge computing: edge equipment and devices designed to exploit the new telecommunications networks, especially in the 5G spectrum.

THE PARADIGM SHIFT AND DATA CENTERS.

As the next generation of digital infrastructure is developed, there is a widespread expectation that a new level of Data Centers, or at least computing and storage capacity, will need to be built to meet the latest demands of edge computing.

The Internet of Things (IoT), the distributed Cloud, and other instances of Edge use cases will require computation, routing, storage caching, localized analytics, some automation, and policy management close to where there are users and "things."

451 Research[6] predicts that different types of Data Centers will be required, spanning from Hyperscale Cloud to extensive colocation facilities located near or close enough to the point-of-use to support many applications, to new Edge Micro-modular Data Centers at the Edge and smaller clusters in a capacity that is not large or critical enough to even be described as Data Centers.

> *Around 10% of the enterprise-generated data is created and processed outside a traditional centralized Data Center or Cloud. By 2025, Gartner predicts this figure will reach 75%...*
>
> *para 2025 esta cifra alcanzará el 75 %".*[7]
>
> **Santhosh Rao | Gartner**
> Senior Research Director

[6] 451 Research. (2017). Edge data centers and networking topologies.
[7] Gartner. (2018). What Edge computing means for infrastructure and operations leaders.

CATEGORIES ON THE EDGE

The true Edge is sometimes defined as the "zone" where you need to have near real-time response and action, measured in less than 2 milliseconds (low or ultra-low latency).

Ideally, there would be no (or very few) network paths or "hops" and little or no use of shared communications infrastructure between the user or data collection point and the processing site.

In some cases, telecommunications gateways, such as base stations and 4G and 5G towers, will require the capacity of a dedicated Data Center to be in proximity, eventually, in the form of micro modular Data Centers.

Some applications, including process manufacturing and vehicle teleoperation, generate data that require rapid response and action. They need platforms that transform data streams into formats that applications can process and act on the data in real-time. Wireless networks that back this up with management software, protocols, processing, and storage are ultra-reliable low-latency communications. In these environments, compute, and storage capacity is required very close to the point where data is generated.

WHERE IS THE EDGE?

The location of the Edge itself is defined by the application and the calculation of the workload. It may include the physical or virtual location of the following:

Data: where it is initially generated, including sensors and other devices (things), and are then processed, analyzed, consumed, and stored.

Connections: carrier-neutral or carrier-specific connectivity services with cross-connections, Cloud exchanges, or direct connections (including dark fiber to other Data Centers). The physical point where data is integrated can also be considered the Edge.

Telecommunications gateways: entry or access points to WAN, including fiber and cellular, Cloud computing, and other networked IT service environments.

[8] 451 Research, Op. Cit.

Also, the Edge can be defined in general terms as the "zone":

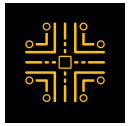
- Sub-millisecond latency, or low single-digit latency, cannot, for the most part, be guaranteed in the available networks.
- Performance and security have been designed to process, analyze, securely store and forward large amounts of data.
- Possibly connect to other applications and data sources without returning to a centralized Cloud service.

Therefore, Edge Data Centers are likely a mix of micro Data Centers and more extensive facilities, including enterprise, colocation, and Cloud Data Centers that are deliberately or coincidentally located close to the data user.

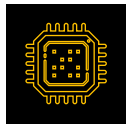
Cloud heavyweights are rapidly building hyperscale installations with direct fiber links to leased colocation sites. These direct connections reduce latency and increase security and reliability by bringing hyperscale Cloud capacity to the Edge.

The cycle closes once data is consumed or integrated. It will generally be moved or transmitted to remote, large Data Centers to be collected, analyzed (including through integration with other data and applications), and archived.

Thus, while perimeter computing is not a specific technology, it will incorporate and attract a host of Data Center technologies and techniques that will make perimeter processing and storage a more effective deployment option. These include, but are not limited to:

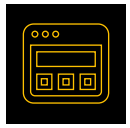


- Converged edge infrastructure that incorporates IT, communications, and facilities.

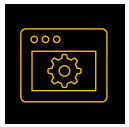


- Micro modular pre-manufacturing and packaging.

- New designs for intelligence integrated infrastructure.



- Software tools specifically designed to analyze, store, integrate and forward data.



- Policy-based software designed to initiate automated actions at the Edge.

- Remote, integrated facilities and IT management included "as a service."

- Distributed flexibility and availability tools.

ENGINES THAT DRIVE EDGE DATA CENTERS

■ **Perimeter sensors** can generate vast amounts of data and easily exceed an Internet connection bandwidth.

■ **Edge helps optimize costs** in telecommunications and connectivity of high-capacity long-distance links.

■ **M2M** in industrial applications where the interaction is between two machines.

■ **5G** technology.

■ **AI:** machine learning algorithms can be sent to distributed computing, allowing for organizations to put more real-time intelligence in the places where data is generated.

■ **Savings**: for all economies of scale offered by the Cloud, the cost of storing and processing large data sets is not insignificant.

As data produced at the Edge explodes, companies find that it is not cost-effective to move all the data back to a central processing facility, even if bandwidth and latency are not an issue.

BENEFITS OF EDGE COMPUTING, ALSO KNOWN AS PERIMETER OR EDGE COMPUTING.

■ Unlock the potential of the vast amount of untapped data created by connected devices.

■ Discover new business opportunities.

■ Increase operating efficiency.

■ Deliver faster, more reliable, and consistent experiences for your clients.

A McKinsey & Company study found that an offshore oil rig generates data from 30,000 sensors, but less than one percent of that data is currently used to make decisions.[9]

On the other hand, for processes that do not need an internet connection, a local repository may be more secure and may not need the mandatory anonymity of the data stipulated by the law.

> *Edge computing represents a potential value of $175B–$215B in hardware by 2025.".*[10]
>
> **McKinsey & Company**

Finally, the scalability of Eddge Computing makes it incredibly versatile. By partnering with local Data Centers, you can efficiently address regional markets without investing in costly infrastructure expansions.

So that in contrast to recent technological advances, such as Cloud computing (where most of the gains were captured by a few significant players in the technology sector), perimeter computing creates opportunities in a wide range of industries.

In addition, although much of today's technical infrastructure is industry-independent (the same Cloud that drives an e-commerce engine also drives a bank's workflow), cutting-edge IT technologies must be more specialized. For example, data storage and computational power needed for precision agriculture will differ from those required to run durable mobile medical devices or safety equipment in a mine. [1]

USAGE

Driving real-time interactions with customers is critical to maintaining their loyalty no matter where they are. This increases as consumers expect Siri, Alexa, or Google Home to make some payments or inform them of the weather forecast specific to their location.

Edge solutions take many forms: they can be mobile in a vehicle or smartphone. On the other hand, they can be

static, as when they are part of a building management solution, a manufacturing plant, or an offshore oil rig. Or a mixture of the two, as in hospitals or other medical environments.

[9] McKinsey & Company. (2017). How can we recognize the real power of the internet of things.
[10] McKinsey & Company. (2018) New demand new markets: What edge computing means for hardware companies.
[11] Ídem.

Edge Data Centers act as gateways. For example, in a vehicle, an Edge solution can collect local data from traffic signals, GPS devices, other vehicles, proximity sensors... and process this information locally to improve safety or navigation.

By 2021, IDC expects there will be more than 7 million service delivery locations containing significant network, storage, and computing infrastructure. They will be optimized for extremely low latency, local service resiliency, and data control required to deliver an optimal digital experience at a specific location at one particular time.

5G technology will be an excellent opportunity for Edge Computing to deliver on promises such as doctors performing complex remote surgical procedures using robots or for cities to collect real-time information on traffic, weather, and crime.

Edge Data Centers make it possible to serve end-users efficiently with little physical distance or latency, especially valuable for content providers looking to offer uninterrupted streaming services.

Also, unstructured information (audio, images, pictures, or videos) collected by perimeter networks can be processed locally to provide fast services or be sent back to the network core, where powerful analytics and machine learning programs will examine it to identify trends or valuable data.

By incorporating new IoT devices into your edge network architecture, your company can offer innovative and improved services to your clients without having to expand your IT infrastructure since devices built for this purpose bring a dramatic range of possibilities to organizations that value innovation as a means to drive growth. It is a significant benefit for industries looking to expand network reach in regions with limited connectivity, such as healthcare or manufacturing.

[12] IDC. (2019). Scale is the secret when it comes to the edge.

BUILD, BUY OR LEASE?

As with all rapidly evolving technologies, implementing and assessing the performance of Edge Solutions has its risks, one of which is security since perimeter computing exponentially increases the surface area for attacks.

Another concern is that the cost of implementing and managing an Edge computing environment can quickly outweigh the benefits. Also, these can become victims of their success, and at that point, scalability may become a serious issue as things and people connected to the network proliferate.

The most important thing to consider when it comes to Edge Computing is establishing what stays in the Cloud. Experts warn that the risk is that if you put too much at the Edge, it's easy to overwhelm the platforms.

THE "MOST"

Whichever option you choose, don't forget:

■ Manage large-scale software distribution.

■ Benefit from open-source technology.

■ Make use of a state-of-the-art IT solution that fosters innovation and manages the diversity of equipment and devices in today's market.

■ Address security concerns.

■ Ensure that the right workloads are on the suitable machine at the right time. Verify that there is an easy way to manage and enforce your company's policies.

■ Partner with someone reliable with extensive experience in the industry.

■ Find a provider with a proven multi-Cloud platform and a comprehensive portfolio of services designed to increase scalability, accelerate performance, and strengthen security in your perimeter deployments.

■ Ask this business partner about extended services that maximize intelligence and performance at the Edge.

■ Verify that this business partner also manages workloads across all Clouds and from any number of devices, deploys applications to all Edge locations reliably and seamlessly, maintains the receptiveness and flexibility to adapt to changing needs, and operates more securely and with more confidence.

A dedicated Data Center includes up-front construction and continuous maintenance, and consequently, over time, a certain amount must be made available to meet new needs.

Acquiring space in a world-class Edge Data Center allows you to take advantage of this technology with the best practices and support of experts who can guide you to transform your company, providing tailored service to provide your customers with faster response and a better experience.

On the other hand, Perimeter computing offers a much less expensive route to scalability, giving you the ability to expand your computing capacity through a combination of IoT devices and Edge Data Centers, according to Santiago Suinaga, Business Unit Director at KIO Data Center.

WHAT DOES THE FUTURE HOLD?

Edge computers will soon be all around us, performing distributed computing on multiple devices in homes and factories, on farms, and throughout the public infrastructure.

The forces that fuel the demand for these devices and the technologies that enable them are advancing rapidly.

For Tech companies, its development will revolutionize the industry with customized solutions for various use cases. This will create a new revolution that will span from the device to how these products are sold, implemented, and maintained. The resulting changes will affect all players: manufacturers, integrators, and consumers across a wide range of industries, as well as companies and leaders who want to participate.

The game is changing; that much is clear. If you want to be part of it, today is the right time to begin.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