tierpoint

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Whitepaper

Executive's Guide to Edge Computing

Introduction to Edge Computing

Your cloud and infrastructure strategy can contribute to your business's bottom line. Edge computing puts data centers close to your customers or smart devices to lower connectivity costs and deliver superior performance. Edge vendors have starkly different visions about what is edge computing, however. The good news is you can achieve the ROI of "The Edge" and avoid a science project by working with an established edge data center provider with turnkey edge infrastructure.

Small private clouds positioned intentionally in local edge data centers are solving business problems that hyperscale public clouds and centralized data centers alone can't. Like the growth of centralized clouds in the past decade, edge computing is forecast to grow steadily – 27% annually through 2023[i]. Within a few years, servers in edge data centers will

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27% annual global growth rate for edge computing through 2023

60% of servers will be located in an edge data center by 2025.

(Source: Bell Labs)

outnumber servers housed elsewhere: Sixty percent of servers are expected to be located in an edge data center by 2025[ii]. Rather than replacing hyperscalers like Microsoft Azure or AWS, businesses augment these public clouds with edge computing to support their IT strategies and digital transformation.

Hyperscale public clouds have helped businesses become more agile, but they are not right for every workload. Centralized computing results in communication delays (latency) if the cloud servers are far away. Edge computing solves business problems by getting data centers closer to the devices that generate the data and to the people that use the data. In doing so, edge computing can enable innovative applications, increase competitiveness, and lower connectivity costs.

Edge computing expands the IT toolset, complementing other types of cloud computing as part of a multicloud strategy, by combining compute, data storage and networking in a cloud closer to where it is needed. Edge also complements and differs from other types of localized solutions, such as on-premise cloud deployments, data-forwarding platforms, and single-purpose servers for networking, storage or compute.

Edge data centers take many different forms. A micro data center in a shipping container or street-side cabinet may provide limited or no services. A rack in an established edge data center nearby will provide advanced cooling, connectivity and power services.

Why Businesses Choose Edge Computing for Some Workloads

Businesses whose customers are other businesses choose edge computing for three main reasons: reduced latency, lower costs, and improved security.

Reduced latency. Latency is the lag time of data communications. The propagation of data to or from a cloud is limited by the speed of light and other sources of delay. The result is a lag in data transmission that can impair real-time decision making and customer satisfaction.

Verizon estimates its latency is 45 milliseconds (ms) within North America and 90 ms transatlantic from New York to London[iii]. To send data to a cloud and back incurs latency twice; it's cumulative. Analyzing the data at a nearby edge data center can cut these delays noticeably.

"Enterprises have been talking about edge data centers since before the term Edge was popularized. They'd say, 'I need a data center that's closer to my end users or close to HQ,' with the goal of reducing latency or connectivity costs."

- Dominic Romeo,
Director of Product Management, TierPoint

"When you're inside a 50-mile radius, latencies get really, really low," explains Romeo. "The time it takes for a command to be sent to the server and for the server to come back with a response are in the neighborhood of single-digit milliseconds versus double- or triple-digit milliseconds of round-trip time. That can have a tremendous impact on the customer experience and the types of applications you can support."

Lower costs. Network bandwidth and data storage are expensive. Analyzing data at the edge can reduce the amount that needs to be forwarded to or stored at a distant centralized location.

Cost savings also accrue by delivering services to customers from edge data centers in Tier 2 markets, which typically cost less than delivering the same services in higher-cost, Tier 1 markets.

Improved security. Edge security involves the same stringent controls as IT security while providing security advantages for some workloads. Edge computing can process the workload's data locally to reduce the amount of sensitive data that the business needs to transmit, and it can anonymize the data before transmission to protect personally identifiable information. Storing data at distributed sites limits the amount of sensitive data stored in any one location.

Use Cases for Edge Computing

Edge computing allows businesses to deliver and consume services that save time and support business relationships, increase revenue, and deliver new value in industry verticals.

Connect with partners. The edge is a great place for businesses to connect with each other. Edge computing allows businesses to connect with partners and providers. Lower-latency network connectivity at the edge flows both ways, creating shorter and faster connections that drive internal productivity. Faster response can create more revenue for your business and is essential for applications such as material requirements planning (MRP) and supply chain operations.

More responsive to customers. Many types of enterprises will choose an edge data center strategy to deliver higher performance, lower-cost service to their customers. When you're competing with digital-savvy organizations, an extra 30 milliseconds of wait time due to latency can make a difference, especially when your customer is the one who is doing the waiting.

Smart cities. Smart manufacturing. Smart agriculture. Smart stores. When you hear "smart" these days, it often refers to a network of Internet of Things (IoT) devices. IoT devices flourish at the network edge. Typically, these smart devices are wireless digital sensors that collect a lot of data but lack on-board processing to extract insight – IoT devices are a little smart, not a lot smart. As a result, smart devices often need special purpose accelerators placed at the network edge to compute for them.

Local information processing and two-way data flow – back to the device or user, to a centralized cloud, or both – enables smart technology use cases.

$3.2B U.S. edge computing market size in 2025 [iv]

45% percent of IoT data acted on at the edge in 2020.[v]

Machine-to-machine (M2M) applications will account for half of all devices and connection by 2022.[vi]

(Source: Cisco)

Business applications enabled by edge computing include:

- Asset tracking
- Autonomous delivery
- Defect detection
- Environmental monitoring
- Equipment monitoring
- Farm monitoring
- Fleet vehicle diagnostics
- Inventory management
- Machine control
- Patient monitoring
- Remote facility monitoring
- Robot surgery
- Security services
- Vision-based analytics

Combining the need for speed with the capability to gather and process millions of data points with machine learning and AI enables edge computing use cases, such as these.

Chatbot. The faster a chatbot can provide accurate answers to a customer's query, the better will be the user experience.

Drone. Latency could be a showstopper for a drone flying an automated package delivery service.

Industrial Robot. An industrial robot might require artificial intelligence capable of analyzing the environment around it.

Surgical Robot. A surgical robot needs to be able to detect and take action depending on a patient's condition.

Room Service Robot. A room service robot needs to be able to process guests' requests and carry them out.

Technology Trends that Affect Edge Computing

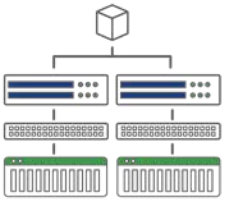
Three technology trends will have an outsized impact on edge computing: 5G wireless networking, multicloud computing, and hyperconverged infrastructure.

5G. 5G devices will supercharge wireless information flow by creating new networking capacity. Imagine this: If 4G is a four-lane highway, then 5G is a 16-lane highway. 5G opens up new lanes for network traffic by using new frequencies in the electromagnetic spectrum.

With faster downloads, higher network reliability, and greater capacity to share more information faster, 5G will be used with edge computing to enable many smart applications and augmented reality.

Edge data centers will need higher bandwidth networking to handle the denser, higher throughput of 5G connections. The result will be lower latency, higher speeds and better mobile connectivity for businesses and mobile users.

Multicloud. One cloud typically isn't the best venue for all workloads. With a multicloud strategy, a business picks and chooses the best execution venue (BEV) for each workload and application. Often, that venue is a private hosted cloud in an edge data center. Businesses will use clouds at the edge together with other types of clouds.



Hyperconverged Infrastructure. As a software-defined solution that combines computer, networking and storage on standardized hardware in turnkey, modular units under unified management, HCI makes edge computing repeatable and scalable – increasing ROI. Some businesses will need one edge data center, but others will need many. Companies with multiple edge data centers can achieve economies of scale by standardizing on a software-defined configuration and replicating it.

Constellations of turnkey edge data centers will be monitored and managed remotely with automated platforms. IT governance also scales with this approach – a central IT organization can configure the business's components at the edge to ensure consistency and adherence to best practices and security policies.

Security Implications for Edge Computing

Aspects of edge computing have implications for security, specifically distributed storage, 5G bandwidth, and the challenge of securing IoT devices. A business using edge computing will need an updated IT security strategy to reduce exposure of the attack surface.

Distributed Storage. Data stored at the edge will need to be secured, possibly at a different location than where business's other enterprise data is stored and secured.

5G Bandwidth. 5G will offer massive attack bandwidth. It will also create a much larger attack surface as private and public sectors implement more internet-connected devices.

IoT Devices. Businesses will need to address the security gaps specific to IoT devices, such as the following:

The Mirai botnet in 2016 demonstrated the global scope of the threat from IoT devices with lax device security. The widespread use of default factory-set passwords allowed Mirai malware to create a botnet that led to what was at the time the largest distributed denial of service (DDoS) attack on record. Similarly, cybercriminals will go after unsecured industrial, retail, healthcare and community IoT devices.

Most IoT workloads are processed at the application layer, bypassing network security protocols – making application-level security even more important.

Most edge devices don't require authentication for third-party APIs or encrypt API data natively. Skipping these security steps allows IoT applications to deliver greater speed and efficiency but amplifies security risk.

How to Secure Your Edge

The good news is that there's huge commercial interest in edge computing security. Many businesses have a vested interest in developing and marketing solutions to keep edge devices and applications safe. 5G and machine learning will be part of

It costs $75 on the dark web to rent a botnet like Mirai, so a security strategy for IoT devices is essential.

the solution, as will good bots and other edge protections that will be efficient and autonomous.

In the meantime, security professionals can protect systems and data from edge security threats by extending the security perimeter, reinforcing security, and applying security fundamentals.

Extend the Perimeter. With so much data stored and handled at the edge, businesses need to extend the security perimeter to the edge, by deploying volumetric flood DDoS protection, advanced application layer 7 protection, and bot protection to edge devices. Many of the newer security applications and tools use AI and machine learning to better understand attack behaviors and strengthen security. Understanding bot traffic, looking at encrypted network traffic flows, and writing behavioral protections to edge devices quickly are within reach.

Reinforce Security. Next-generation security appliances and the ability to employ autonomous protection strategies reinforce edge security. Software-defined networks and mandates for faster data delivery at the edge have led next-generation firewalls and other protection services to be faster and smarter. Don't stop system fortification at the edge, though. Traditional end-point protection services such as antivirus and malware protections – along with real-time system monitoring in a security information and event management (SIEM) tool – enable better responses to attacks.

Apply Security Fundamentals. The same security fundamentals employed for enterprise security need to be applied to stay ahead of edge threats, too. These security best practices include logical isolation, role-based access control, encryption for data at rest and in transit, system hardening, DDoS protection, 24x7x365 security monitoring, physical data center security and patch management.

How TierPoint Serves Your Edge Needs

Your cost savings and ROI will depend on the quality of your edge computing strategy, design, implementation, and management. Turnkey solutions can make your journey to the edge lower cost and more predictable. An experienced edge data center service provider such as TierPoint can reduce your risk and implement a solution customized for your business. We meet you where you are, from colocation to cloud and beyond.

Our data centers check all the boxes for edge computing and more: robust and redundant communications networks, resiliency and guaranteed uptime, scalable infrastructure, physical and operational security, and certifications of compliance.
The size of our data centers drives economies of scale in power and cooling.

Consider these criteria as you explore edge computing providers:

Locations. Edge computing can occur in major metropolitan areas and in smaller markets. We have one of the largest and most geographically diversified edge data center footprints in the nation.

Network fabrics and interconnection. Our data center fabric provides any-to-any high-speed connectivity. Fast, flexible interconnectivity enables the use of other advanced networking technologies and the delivery of managed services, such as disaster recovery.

Diverse connectivity options. We offer high-performance managed bandwidth between our nationwide network of data centers and direct connections to AWS, Azure, and Google hyperscale public clouds. Cross-connects provide redundant carrier-diverse connectivity to the internet and private lines from our data centers.

From Colocation to Fully Managed Cloud. Edge computing can range from your own hardware placed locally in an edge data center to fully managed private clouds. Our data centers flexibly support our customers from colocation to multitenant clouds to private clouds and hyperscalers like Azure and AWS.

Breadth of Managed Services and Disaster Recovery Expertise. As a cloud services provider, we provide edge architecture design to security as a service, database administration, patch management, systems monitoring, and more. Many of our clients choose us for Disaster Recovery as a Service (DRaaS), too.

Expert Guidance on Edge Computing. Our experts can remove the headaches and roadblocks associated with edge computing. TierPoint can help you to simplify, accelerate, protect, and manage private clouds for edge computing.

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Ready to explore the Edge further?

Reach out to our team to learn more about you can leverage the Edge in your Hybrid IT infrastructure.

Contact us today.

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About TierPoint

A leading national provider of hybrid IT solutions, TierPoint helps organizations drive performance and manage risk. No U.S. provider comes close to matching TierPoint's unique combination of thousands of clients; more than 40 edge-capable data centers and 8 multitenant cloud pods coast to coast; and a comprehensive portfolio of cloud solutions, colocation, disaster recovery, security and other managed IT services. With white-glove customer service, TierPoint professionals customize and manage agile solutions that address each client's unique needs.