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Understanding the Key Requirements for Deploying Edge Computing

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Summary

Catalyst

Edge computing is not new but has taken on a new level of importance with digitization of organizations and consumers. IT decision makers and buyers are exploring new use cases and their vendors are developing equipment to meet new requirements for edge located equipment. Some industry verticals have been deploying edge computing for several years, leveraging IoT sensors, such as manufacturing for automation, while others, such as municipal governments, are just beginning smart city project rollouts such as Barcelona rolling out 3,000 street cabinets.

Omdia view

The development of new devices and software technologies in response to a growing requirement to improve business processes, relieve humans of repeatable tasks, and make life more fun is accelerating the global computing demand. At the same time, the nature of devices and applications is changing where the collection and real-time processing of data are becoming increasingly important. As a result, latency and bandwidth are becoming key performance determinants and are driving the need for better telecommunication networks and more computing power to be placed closer to end users and machines. Security and data volume are also factors that can influence end users to place more compute at the edge.

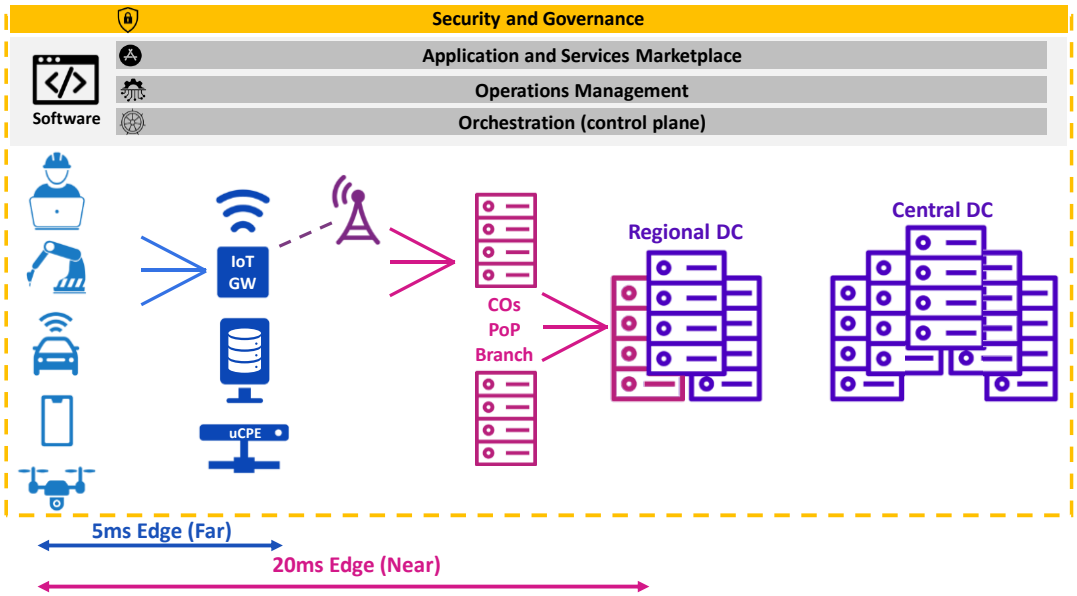
Many enterprises have opted to own their own hardware at the edge instead of relying on cloud service provider (CSP) or telco operated data centers. In fact, enterprises were early adopters of edge computing. Many enterprises have a distributed business models where application support is required at multiple branches, offices, or stores. Additionally, many enterprises have been running latency-sensitive workloads such as healthcare and industrial applications; on-site data consolidation, data sharing, and analytics; and retail store management.

Defining the edge is not as easy as it sounds

Edge cloud is not a single technology, but a combination of related technologies that work together

Omdia has been researching edge computing in depth for several years and has found there still is not a commonly accepted set of definitions or a clear taxonomy. Omdia defines the edge as locations with maximum 20 milliseconds (ms) roundtrip time (RTT) to the end user device, or machine (see **Figure 1**).

Figure 1: Omdia edge model



Source: Omdia

Edge locations can be further subdivided as those less than 5ms from the end-user device or machine (far edge) and those between 5ms and 20ms from the end user or machine (near edge).

From a software perspective, Omdia differentiates between four main categories or functions:

- **Orchestration (control plane)** delivers a standard software platform that enables end users to connect to and access services and applications that run on computing hardware at an edge location. This aspect of management is focused on how it enables services to execute and connect.

- **Operational management** enables the management of computing and storage resources from the edge to the cloud with a focus on cost, service quality, and performance. All edge devices will need to be visible and report some basic metrics, but the near edge will require more operational management capabilities. See below for a discussion of the management element and the changes that Omdia expects in 2021.

- **Application marketplace** is where customers can discover and access applications that run workloads at the edge or in coordination with workloads at the edge. In 2021, Omdia expects growth in the types of applications being developed to operate at and with the edge. The components that make up an application will become more distributed and need to be managed via distributed computing techniques.

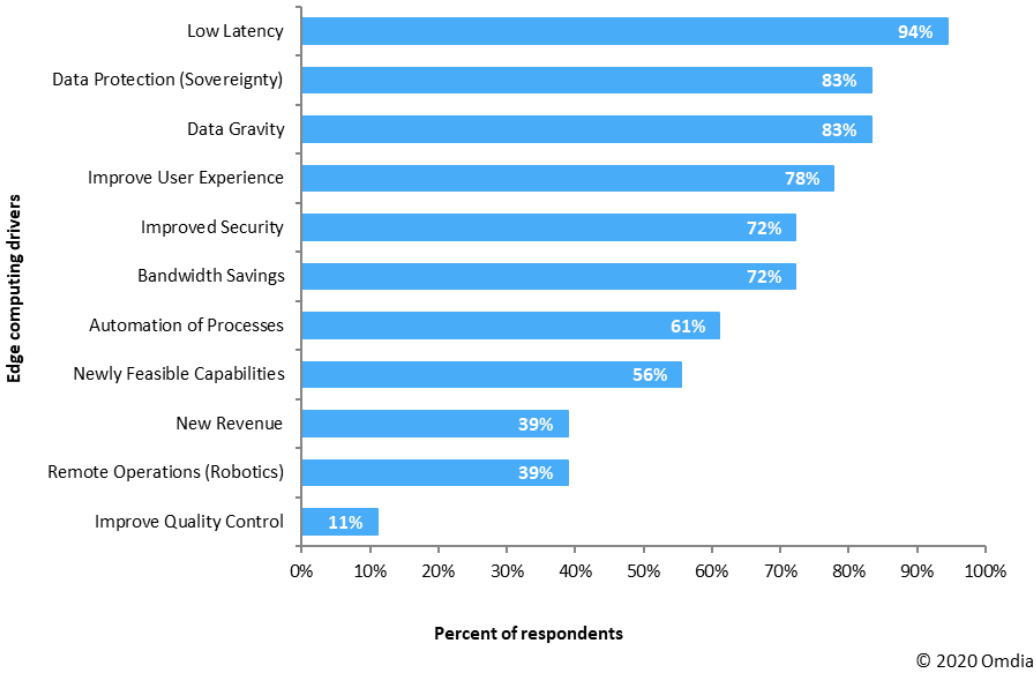
- **Security and governance** are critical capabilities, since the edge increases the attack surface exposed to potential threats. Security will use a multilayered approach that combines hardware-embedded security through trusted hardware platforms (including root of trust function encryption at rest and in transit) and an integrated identity and access control system. The governance of these edge devices must also ensure that they comply with corporate rules and that the policies are as standardized as possible to reduce complexity.

What is driving this push to the edge?

Latency is the top reason for edge adoption, but data gravity and data privacy are considered significant drivers

The key drivers for adoption of edge computing are split between technical features and privacy concerns. The highest rated driver cited by 94% of respondents to Omdia's 2020 edge survey was low latency, as shown in **Figure 2**.

Figure 2: Drivers of edge computing



Source: Omdia

The latency driver is not a surprise as the concept of edge is that the compute is moved closer to the point of need so that real-time analysis/actions can be taken.

This focus on reduced latency is exposed by the frustrations of manufacturers with the current technology available in the Industrial Internet of Things (IIoT) market. According to Omdia's IIoT devices database, in 2019 more than 3.5 billion IoT devices were shipped yet only 2.3% of these were IIoT-enabled. The ability to connect these sensors to cloud gateways and provide real-time responses is the main cause of the frustration. Industrial wireless technology remains a huge untapped market that could be addressed by developments in cellular technology, hence the increased spending by telcos on technologies like 5G. However, Omdia believes industrial 5G is unlikely to be fully realized in the next five years, because while initial 5G launches have begun, many aspects of the technology that are relevant to the industrial use case are still in development. Therefore, manufacturing organizations are looking at edge computing as a practical solution to meet the requirements by having the IIoT devices connecting into an edge computing device that can perform the analysis and store the data to meet the performance required. Omdia believes that latency will remain a key driver for edge computing as long as the network remains an area of concern in terms of its ability to deliver the required performance to meet expectations.

The second most significant driver was related to data: data protection, data sovereignty, and data gravity. In terms of data protection and improved security the edge survey found that 72% of respondents put that as a driver. This focus on privacy and security was supported by Omdia's *ICT Enterprise Insights 2021* survey that found it was the top IT trend for 2021 with nearly 21% of the 5,000 organizations placing as the most important IT trend. In fact, more than 50% of these organizations placed it as one of their top three trends in 2021, which was the clear.

Data privacy and security is a significant issue for many organizations, particularly North American enterprises and others operating outside of the EU that cannot afford the luxury of watching data privacy legislation play out from afar. As with the Health Insurance Portability and Accountability Act (HIPAA) before, bodies of legislation such as the General Data Protection Regulation (GDPR) and the recently enacted California Consumer Privacy Act (CCPA) have already rippled across the entire technology landscape and will continue to do so, demanding immediate action regardless of geography or vertical market. Any company working with data, but especially those working with customer data, must act. Certainly, governments do not always wait for legislation, as was proven by the $5 billion fine that the US Federal Trade Commission (FTC) handed to Facebook in the summer of 2019 for failing to protect customer data from third parties. Edge computing offers a solution to the privacy aspect of data where it is governed by specific country legislation, and it is a big driver for edge computing adoption.

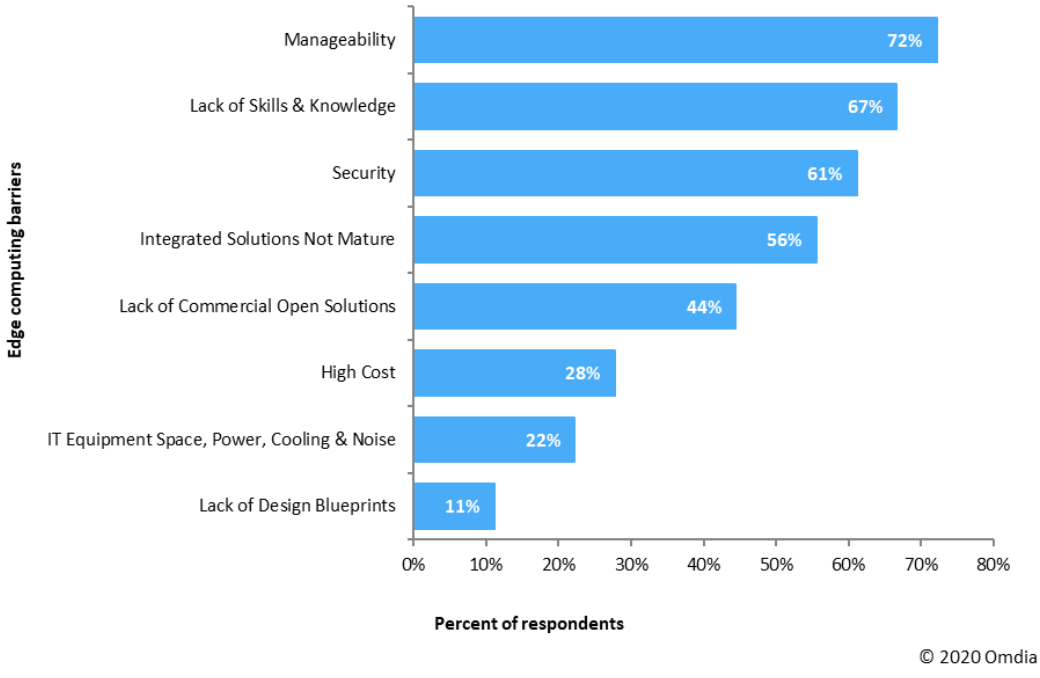
Data gravity and bandwidth savings are another aspect of data that is of concern to organizations, namely the logistics of moving data between core and edge. Edge computing provides a pragmatic solution to the data gravity problem and organizations are blending the twin challenge of data sovereignty and data gravity; both record the same number of respondents in Omdia's edge survey. The ability to reduce the data movement and to ensure critical data remains in a known location are marginally more important than the economics of moving data and bandwidth saving.

The challenges of deploying the edge

Managing of the edge is a current weakness of the ecosystem

Figure 3 shows the response to the Omdia edge survey 2020 question "What are the top barriers for edge computing?" The top response was manageability cited by 72% of respondents, which was supported by a subsequent question "What management tools and processes are typically used to manage edge computing?" The top response to this second question was using existing data center management tools (56% of respondents) and manual processes (39% of respondents).

Figure 3: Challenges organization perceive of edge computing currently



Source: Omdia

This challenge has the echoes of the server virtualization market back in the 2000s when server virtualization technology was more advanced than the IT ecosystem and management became the roadblock to wider adoption until the ecosystem could provide viable tools. Omdia considers that unless the ecosystem can address the edge management challenge in 2021, the edge adoption will similarly slow down because of the practicality of managing securely potentially thousands of edge devices. Omdia accepts that recent moves in the management market have been focused on edge management and these represent early attempts to address the challenges. However, the edge management challenge is bigger than just the application layer and involves the network, data, and IT infrastructure layers.

Aligned to the manageability challenge is the lack of skills, which was the second most important challenge (67% of respondents) in the survey. This is aligned with Omdia's *Emerging Enterprise Services Spotlight (EESS): The State of Edge Services in Europe, 2020–21*, finding most enterprises expect budgets for edge computing to increase either moderately (45%) or significantly (10%) in the next 12 to 24 months. However, the barriers reported in the Omdia EESS survey parallel the results in **Figure 3**, where 50% of respondents in the Omdia EESS survey indicated that they expect to invest and launch edge service offerings covering skills, training, and education in 2021.

Surprisingly, security was only the third biggest challenge, mentioned by 61% of respondents. Omdia considers that this is due to many of the nuanced security issues are not yet well enough understood and are therefore not top of mind. Edge-based device security is harder to implement than cloud-based security in many ways because the device is physically accessible and vulnerable to tampering. This calls for hardened silicon and hardware packaging, which makes it tougher for attackers to gain control of or access the device. One of the new areas where security has emerged as an important consideration is to protect the data gathered and used by AI at the edge. Unlike the cloud, which has a largely homogeneous hardware and software stack, the device ecosystem is heterogeneous in nature, with multiple hardware, software, and middleware configurations that are harder to plan for from a threat vector perspective. Omdia believes that the organizations need to consider where they can standardize and where they can be more heterogeneous. A software stack that can apply security and compliance policies to heterogeneous infrastructure would appear to represent the current optimum approach.

The move to cloud-native is a new opportunity for HCI

Workloads are moving to cloud native

The challenge for many CIOs faced with the seemingly inevitable move to the edge and cloud-native environments is to provide a platform that matches the organizations strategic intent. HCI represents an option for edge and cloud-native workloads but must be considered differently to typical discrete on-premises infrastructure as its value proposition and cost equation is different. CIOs must identify the workload types that HCI is most suited for in their estate and to include HCI in any architecture for the digital enterprise. Omdia considers that HCI plays an important role in ensuring the balance between cloud and on-premises is maintained for an organization. HCI is not a silver bullet for all situations, but it is a perfect solution where its capabilities are matched to the business needs, such as simplicity of use and management, speed to implement, flexibility to be right-sized for any specific use-case, maximizing the efficiency of space and power usage to deliver the performance required, and the ability to deploy in edge locations.

According to Omdia's ICT Enterprise Insights 2021 IoT, Cloud, AI, & 5G survey, nearly 32% of organizations stated that adopting cloud services is significantly more important as a result of COVID-19. The top driver in Omdia's data center automation survey 2021 was the ability to adopt newer technologies. This is not a surprise as the management of newer technologies is often a significant challenge for IT departments. Globally, the use of legacy applications (on-premises monolithic applications such as core banking systems etc.) remains flat at 19.3% of the market, but by contrast, the move to adopt cloud-native workloads is growing. In fact, Omdia's ICT Enterprise Insights 2021 survey found that the number of respondents that have zero containerized workloads in a production environment will decrease by over 22% by 2022. Omdia research shows that for edge deployments cloud-native workloads running inside VMs represent the dominant approach. One of the biggest drivers behind this approach is the better security isolation that a VM provides compared to cloud-native, which is isolated on the namespace only.

Final thoughts

Omdia is in the early days of understanding the emerging edge computing market. As with many emerging markets, edge computing has existed in some forms before the concept edge computing became the subject of much discussion. However, there are significant changes that are transforming computation at the edge, driven by the digitization of the organizations and consumers sparking the development of new use cases that require the ingestion and processing of data and response in real time. In response to this demand, the transformation of the IT ecosystem is creating a distributed computing platform stretching from the cloud to the edge, where the portion of computation performed at edge locations will increase.

Edge computing represents a high growth opportunity for CSPs and telecommunication providers, with many new cloud services launched in the last 12 months and the ongoing deployment of 5G by telecommunication providers. In addition, the push to provide enterprises with edge computing services has turned a very competitive relationship between CSP and telecommunications companies into a collaboration. Both CSP and telecommunication providers are striving for new innovations in collaboration with their enterprise buyers as they deploy the new low latency and data gravity edge computing use cases.

Vendors and open source hardware and software organizations are also stepping up to play a significant role in servicing the enterprise on their journey to deploy edge computing. The timing for introduction of new equipment is perfect to capture market share and take a market leadership position as technology trends shift in response to new edge computing use case requirements. Looking at the enterprise edge computing deployment journey characterized by respondents in Omdia's survey, a majority of organizations will be conducting PoCs by 2022, with 20% having fully deployed the current use cases they are trialing in 2020 and 2021.

Appendix

Methodology

Omdia conducts a number of end-user surveys on a range of different topics, these surveys are of qualified IT buyers only, or dedicated line-of-business senior managers and range in size from a few hundred to thousands of respondents. Omdia uses this data as well as market tracking data and models it has built on key technology sectors. Omdia analysts have regular briefing with technology vendors and also speak to Omdia enterprise clients as sources of additional information. This report uses a combination of all these sources and methods in developing its analysis of the middleware management automation challenges

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Omdia consulting

Omdia is a market-leading data, research, and consulting business focused on helping digital service providers, technology companies, and enterprise decision-makers thrive in the connected digital economy. Through our global base of analysts, we offer expert analysis and strategic insight across the IT, telecoms, and media industries.

We create business advantage for our customers by providing actionable insight to support business planning, product development, and go-to-market initiatives.

Our unique combination of authoritative data, market analysis, and vertical industry expertise is designed to empower decision-making, helping our clients profit from new technologies and capitalize on evolving business models.

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We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help your company identify future trends and opportunities.

About Sunlight

Sunlight.io is a complete edge computing platform – enabling enterprises to standardize and simplify their edge projects and deliver a true "edge-as-a-service" capability.

Sunlight includes the NexVisor hyperconverged stack (HCI), distributed cluster management and application marketplace, making it easy to deploy and run demanding applications across hundreds of distributed far-edge locations such as retail stores, factory floors and healthcare facilities. Sunlight brings all of the simplicity of datacenter HCI, with none of the bloat, enabling truly tiny far-edge deployments. Sunlight requires

minimal skillsets to install and manage – so little to no IT skills are needed to scale up a cluster or replace a server at an edge location.
Sunlight runs on popular x86 and Arm servers such as Lenovo SE350 and HPE Edgeline as well as highly ruggedised servers such as Antillion and LanternEdge. Sunlight's NexVisor product is priced from $100 per node per month for edge deployments.

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