

## MARKET PERSPECTIVE

# Performance Accountability and Edge Decision Making with Couchbase

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## EXECUTIVE SNAPSHOT

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### FIGURE 1

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#### Executive Snapshot: Performance Accountability and Edge Decision Making with Couchbase

Workloads running in new edge locations are increasingly relied upon as business shifts to digital-first operations. Many IT organizations are attempting to make decisions on placement and architectures without a complete picture of performance, latency, and costs. To address this gap, Couchbase has developed a methodology to measure latency for database and network operations.

#### Key Takeaways

- Enterprises should understand that performance, latency, and costs are central to making good decisions on edge architectures and solutions. The widespread distribution of data, people, and connected things requires a multifaceted approach to edge IT service.
- Network duration response times vary greatly across cloud service provider edge locations.
- Modern, net-new applications for web, mobile, and IoT demand an effective edge strategy. Both providers and buyers will benefit from an approach that carefully matches the options to an application's workload and purpose.

#### Recommended Actions

- Embrace the fact that no one edge solution will meet all needs. Although simplicity and standardization are preferred, the reality is that gathering, processing, analyzing, and storing data will take a complex village of providers and solutions.
- Apply business decision making to all edge decisions and seek to understand the cost and performance profiles of all workloads.

Source: IDC, 2021

## NEW MARKET DEVELOPMENTS AND DYNAMICS

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As organizations shift to digital-first operations, they are requiring IT service in new edge locations to bring data processing closer to where data is generated and accessed. Edge computing is becoming an essential part of innovating and delivering new digital services to improve operations and deliver new customer experiences.

The expansion of 5G and IoT data will accelerate demand for data gathering, analysis, and connectivity across disparate facilities and locations. Bandwidth-intensive applications such as rich media experiences and interactive content can overwhelm core networks. Other applications require faster response times than cloud and core datacenter infrastructure can deliver. Having enough network bandwidth to support 5G is a top concern for organizations and this will likely increase as the volume of data expands exponentially.

### Cloud Service Providers Extend Customers Reach to Edge

Faced with the need to deploy resources into hundreds or even thousands of locations, many organizations are leaning more on cloud providers for the scale and agility they can deliver. The cloud providers have also acknowledged that to meet customers' needs for IT service in new locations, infrastructure often needs to reside outside of core datacenters. With an eye on delivering the same experience regardless of location, cloud providers have bundled preconfigured solutions. Following are some of the offerings on the market today:

- **Regional and metro edge service** includes compute, storage, and database applications for very low-latency applications such as video rendering, graphics, and virtual desktop applications. Solutions are deployed at the cloud provider's many sites around the world and include AWS Local Zones and Azure Edge Zones.
- **Multi-access edge compute (MEC)** includes cloud platforms embedded in cellular base stations and other nodes. Solutions include AWS Wavelength, Azure private MEC, and Google Mobile Edge Cloud.
- **On-premises and colocation edge solutions** include fully populated racks containing all the hardware, software, and connectivity equipment to rapidly deploy edge services. Examples include AWS Outposts, Snowball Edge, and Snowcone; Azure Stack Edge, HCI, Hub, and Modular Datacenter; IBM Satellite; Google Anthos; and Oracle Cloud@Customer.

### Navigating Edge Choices

Deciding on the best solution for the job is a difficult one. All are designed to tackle data gathering, analysis/processing, and connectivity outside of the core/cloud datacenter and put IT services closer to people and things that generate data. The myriad of edge options and lack of data on actual performance and cost make choosing a solution that is best for not only low latency but also cost optimization a guessing game for all but the most experienced and technical users. Although having IT service outside of a core datacenter is nothing new, demanding new workloads have emerged that change the traditional decision-making process. Understanding that high performance and low latency are central to the success of these new edge deployments, cloud providers have put together a broad range of offerings. Choice is a good thing, but many organizations find themselves overwhelmed and without a complete set of data to drive the best business decisions.

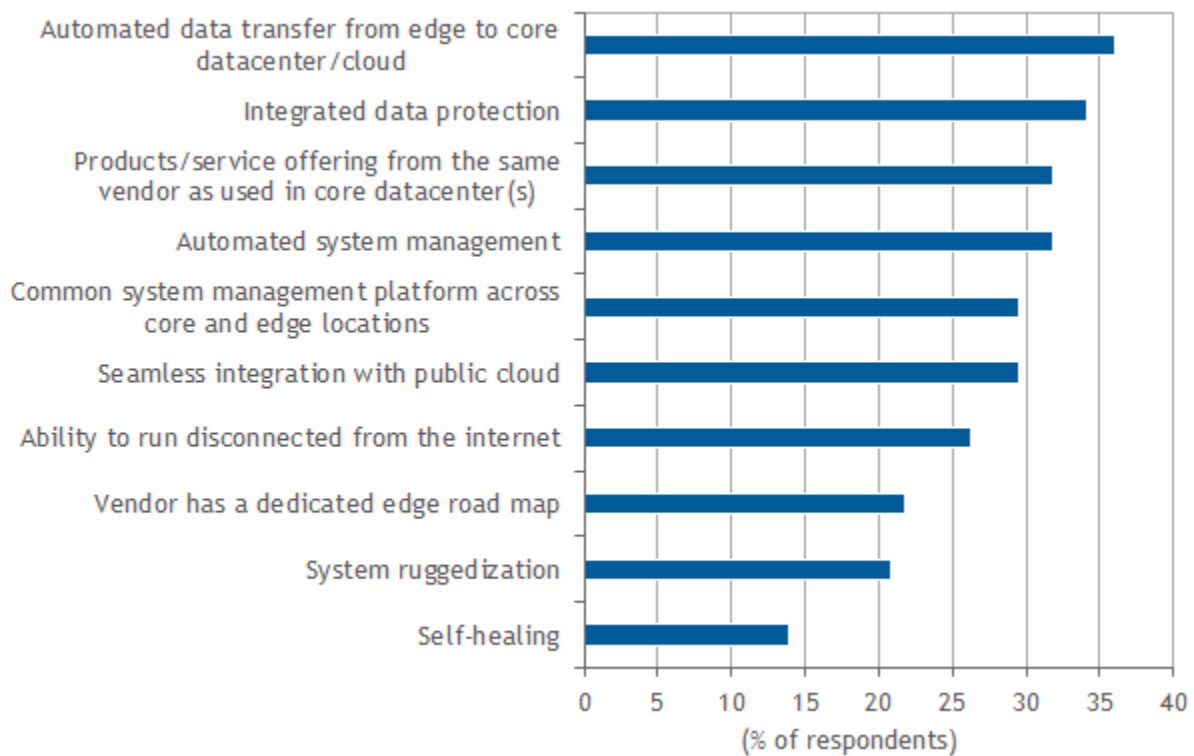
Navigating the new edge landscape requires understanding performance, latency, and costs across the broad menu of available compute options. For most organizations, a combination of multiple

deployment types will be necessary and yield the most value from edge IT spending. Savvy IT organizations are still building their edge strategies and navigating the complexity of the many providers and solutions required to make seamless IT service across core and edge work well. Many factors are important in edge decisions, but organizations already understand that the flow of data from edge to core/cloud datacenter is a critical need and differentiator. In an IDC July 2021 survey, automated data transfer from edge to core was the most common factor in purchase decisions for compute and storage for edge (see Figure 2).

**FIGURE 2**

**Edge Infrastructure Decision Making**

Q. Which of the following factors are most important when considering purchase of compute/storage products or services for your edge locations?



n = 308

Source: IDC's *IT Infrastructure for Flexible/Hybrid IT Survey*, July 2021

**Couchbase for Database Performance at the Edge**

One of the primary drivers for positioning IT infrastructure in new edge locations is to reduce latency and improve performance. Couchbase, formed in 2011, offers a distributed, NoSQL document database oriented for scenarios requiring high throughput, responsiveness, and availability, including web applications, mobile apps, and IoT. Its portfolio includes the main Couchbase Server product, as well as Couchbase Lite, which is meant to be embedded on devices to provide continued operation when network connectivity isn't available. A third product, Sync Gateway, syncs data between

Couchbase Lite instances in the field and Couchbase Server running at the edge or in the cloud. As well, Couchbase Lite instances can sync directly using peer-to-peer services. Couchbase has support for on-premises bare metal, virtual machine or container, and public cloud deployments.

Couchbase – which competes with the likes of MongoDB, Amazon DynamoDB, and CouchDB – differs from databases traditionally used for systems of record, such as Oracle, SQL Server, and IBM Db2, in that it uses a key-value store of JSON documents instead of a relational schema of rows and columns. In this approach, "key" refers to a document's unique identifier and the "value" is the JSON document. One common analogue to key-value stores is a product catalog, where the product's SKU is the key and the value is the full product record. Key-value stores can offer advantages over relational databases in areas such as speed and horizontal scalability.

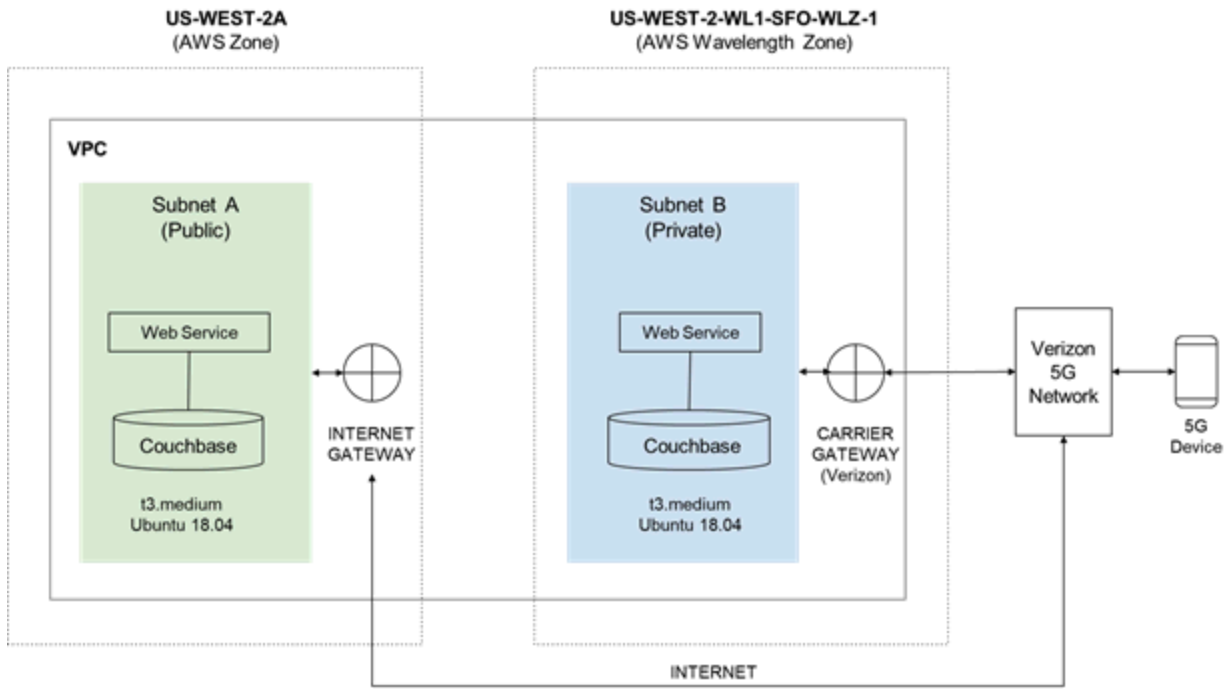
Couchbase aims to provide a "best of both worlds" approach, with support for SQL queries and ACID transactions, as well as scopes and collections, which echo the schema and table concepts of a relational database.

As 5G networks roll out globally and subsequently have implications for edge computing scenarios, Couchbase conducted network performance tests on two AWS services aimed at lowering latency for customers, Wavelength and Local Zones. With Wavelength, AWS has partnered with telcos such as Verizon to install its compute and storage infrastructure at the edge of 5G networks. Local Zones extend a subset of a traditional AWS Region's functionality to areas that aren't close to one.

First, Couchbase ran tests comparing the performance of an AWS Zone to a Wavelength Zone with network connectivity provided by Verizon's 5G network, using a 1,000-byte payload (see Figure 3). The median round-trip time between client and server for GET document requests to a Couchbase Server in a traditional AWS Zone was 160ms compared with 54ms when using Wavelength, a difference of nearly 67%, according to the company. SET requests were reported to take 156ms and 30ms, respectively. However, the company's test found that round-trip performance was even better when using a Local Zone with a wired connection (see Figure 4). In this case, GET requests took 89ms with a standard AWS Zone and 19ms with a Local Zone. SET requests were reported to take 32ms and 7ms, respectively (see Table 1).

**FIGURE 3**

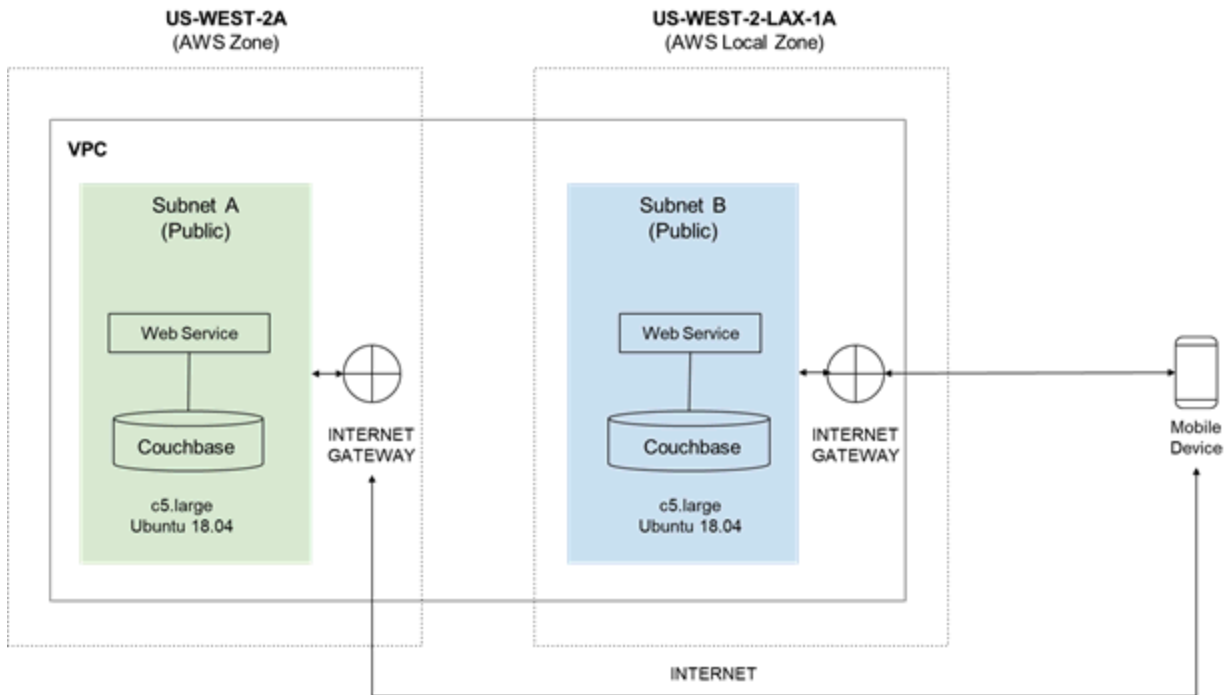
**Couchbase Test Architecture for AWS Wavelength**



Source: Couchbase, 2021

**FIGURE 4**

**Couchbase Test Architecture for AWS Local Zone**



Source: Couchbase, 2021

**TABLE 1****Couchbase Test Results for AWS Wavelength and AWS Local Zones**

	Request Type	Time (in milliseconds)	Difference (%)
<b>Median network duration measured on 5G ultrawideband connectivity</b>			
AWS Zone	Get	159	
	Set	156	
AWS Wavelength	Get	53	-66.6
	Set	29	-81.7
<b>Median network duration measured on Local Zones</b>			
AWS Zone	Get	89	
	Set	31	
AWS Local Zone	Get	19	-79.1
	Set	7	-78.1

Source: Couchbase, 2021

**ADVICE FOR COUCHBASE AND CLOUD SERVICE PROVIDERS**

Connectivity performance can vary greatly, and today many organizations do not have access to the metrics they need to drive good decisions. Gaining insights into performance requires a level of coordination and transparency across cloud, communications service providers/telcos, and colocation providers.

Organizations will continue to need data on performance and costs to guide their edge decisions. Digital-first operations will require an increasingly complex set of solutions from multiple providers to extend data gathering, analysis, and connectivity around the world. Choice in solutions is appreciated and will drive greater innovation and performance in the coming years.

Couchbase and the cloud service providers' ability to be more transparent in helping organizations understand performance, latency, and costs will foster trusted partnerships. Organizations will be wary of providers seeking to promote one solution over another when it doesn't make the best business sense for that particular use case. If providers seek to become trusted partners, they will work to provide ways for customers to better understand and navigate the overwhelming options for edge IT

service. This requires a level of coordination among applications, infrastructure, and connectivity providers, making the task complex.

The fact that Local Zones provided superior performance to Wavelength is not surprising, given the continued speed advantage of wired networks over mobile wireless network speeds. Yet the reported advantages both Local Zones and Wavelength provided compared with traditional AWS Region deployments are significant both from a Couchbase and customer perspective.

For Couchbase, this demands more nuanced messaging on deployment advice as customers increasingly adopt and create modern web, mobile, and IoT applications that require strong performance and responsiveness. Customers in turn would be wise to conduct their own tests of various types of edge computing options and map the results to applications' real-world needs.

It is worth noting that 5G remains in its early days both as a technology and as a prominent citizen in the broader enterprise computing ecosystem. Case in point: As of today, Couchbase's tests of 5G performance were confined to Verizon in the United States, so a comparison of performance with rival 5G networks such as AT&T and ones in other territories is not available. (Couchbase says it is mindful of this and is advising clients on their networking needs as the options emerge and evolve.)

The 5G landscape is also undergoing changes that blur the lines between cloud providers and telcos. For example, AT&T recently made a deal with Microsoft that will see its 5G network run on Azure for Operators. While AT&T will continue to operate the network, Microsoft purchased the underlying Network Cloud platform from AT&T. Other 5G providers including Verizon, Swisscom, and Dish Network continue to hatch and evolve deep relationships with hyperscalers, meaning that questions about pricing and go to market remain open.

Ultimately, Couchbase's tests provide one example of the complexity enterprises face in adopting the right approach to edge as they ponder its potential benefits for their business. Effective communication and more collaboration among telcos, hyperscalers, software providers, and enterprises will help bring the best results for all.

## LEARN MORE

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### Related Research

- *Fast-Tracking the Edge Journey with Vapor IO, Zayo, and VMware* (IDC #US48118821, August 2021)
- *Worldwide Public Cloud Infrastructure as a Service Market Shares, 2020: Data Growth, Edge Use Cases, and Hybrid Deployment Take Center Stage* (IDC #US47350821, July 2021)
- *Edge Infrastructure Software – Market Trends and Outlook, 2020-2025* (IDC #US48091521, July 2021)

### Synopsis

This IDC Market Perspective outlines the need for greater transparency into performance for edge decision making and presents Couchbase's independent testing of AWS edge solutions.

"As enterprises increasingly realize the value of edge and hybrid computing in building modern applications, vendors such as Couchbase serve as foundational elements to their strategies," said Chris Kanaracus, research director, Cloud Infrastructure Services at IDC. "By conducting independent



tests for its technology on AWS Wavelength and Local Zones, Couchbase gains valuable understanding of options for lower-latency deployments that it can pass on to customers."

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