

# AWS DIRECT CONNECT SERVICE:

Bringing Businesses Together





## Executive Summary

Cloud computing is not the future; it is today, having rapidly evolved into an independent, ubiquitous platform capable of delivering unlimited computing power and data storage capacity to businesses on demand. Today, over 90%<sup>1</sup> of all businesses have migrated some aspect of their IT infrastructure to the cloud. Cloud-based services help organizations of all sizes increase agility, lower IT expenses, and scale quickly.

There are several ways to connect to the cloud, with multiple types of cloud-based infrastructures, platforms, and software services to choose from, along with multiple cloud service providers. The undisputed leader in the public cloud computing world is Amazon Web Services, or AWS.

Wave Business offers the low latency, high quality, direct connections between enterprises and the AWS cloud to improve how selected services perform for their employees and ultimate end-users.

This white paper explores the motivations behind enterprises' move to the cloud, the types of clouds and services that are available, why AWS is the cloud service provider of choice, and why businesses should choose to partner with Wave, an AWS Partner, to deploy and support direct high bandwidth fiber connections to the Amazon cloud.





## THE EVOLUTION OF CLOUD COMPUTING

### How Did We Get Here?

The cloud began as a simple concept to store files, images, and music in a ubiquitous server so mobile users could access their data at any time from any internet-connected device, not just their desktop PC. It quickly morphed into a robust independent platform capable of delivering what now seems like a never-ending stream of bidirectional, scalable network services, including infrastructure support, software applications, financial transactions, secure data storage, remote computing, disaster recovery, streaming video, customer relationship management (CRM), social media, and many others.

Today, thousands of enterprises of all types and sizes employ some kind of cloud-based network technology to crunch and store vast amounts of data. The cloud can power network automation through analytics, manage millions of ecommerce transactions per second, present software applications to remote users, and help businesses develop next-generation solutions like autonomous vehicle driving and cancer fighting drugs using artificial intelligence and machine learning (AI/ML) algorithms. In fact, IT analyst 451 Research found 90% of all companies already have migrated some aspect of their IT operations to the cloud. Further, in the wake of COVID-19, 68% of CIOs are “doubling down on cloud technology” to support new populations of remote workers. Organizations are now spending 36% more for cloud services than they did just two years ago.<sup>1</sup> Literally hundreds of millions of end-users and consumers access cloud-based services every day, most without even realizing it.

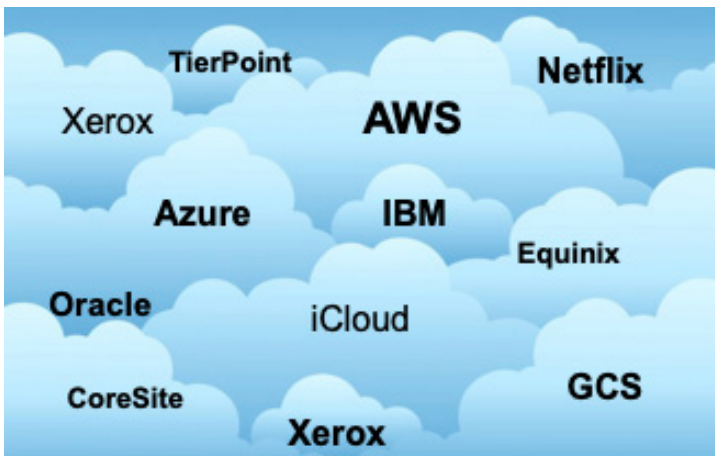
The cloud is not a physical entity, but rather a vast network of remote servers strategically positioned around the globe which are hooked together and meant to operate as a single virtual ecosystem.<sup>2</sup> “The” cloud is all around us, but it is really a collection of multiple clouds, or servers, with the overarching intelligence to balance workloads, route data, and provide compute resources through a connection point physically closest to the requesting user, device, or application to minimize latency. All of the remote servers in a company’s network that are accessible via a web connection—no matter the quantity or location—can be aggregated into a single cloud. But different clouds do different things, and many companies are now connected to multiple cloud-based environments—called a “multi-cloud strategy”—to access services they do not provide organically.



## A GROWING STORMFRONT

The value of the cloud was quickly seized upon by several computing industry giants, and the concept of the cloud service provider (CSP) was born. In addition to the Big 3, (Amazon Web Services, Google Cloud Services, and Microsoft Azure), most every major enterprise from Apple (iCloud) to Xerox (Workplace Cloud) operates a private cloud(s) for its employees, customers, developers, and partners. These companies tend to segregate them into internal and external networks. Beyond that, an entire industry of colocation cloud service providers has sprung up to provide cloud-based solutions and services to small businesses that do not have the infrastructure, budget, or expertise to get to the cloud alone.

By 2020, the global public cloud computing services market had grown into a \$266 billion mega-industry, with a 15% or higher compound annual growth rate expected well into the future.<sup>3</sup> AWS offers virtually unlimited availability of computing power and data storage resources. AWS pitches their service as “reliable, scalable, and inexpensive cloud computing.” AWS is free to join, and customers pay only for the services they consume.



Part of the cloud's attraction, especially for small to mid-size businesses, is the ability to access compute power and resources through a public cloud service provider or colocation facility that would otherwise be well beyond the reach of what the business could deploy and manage by itself. Many cloud services are free; other providers offer scalable pay-as-you-go services for access to data, hosting applications, and compute and storage assets. All that is needed by the customer is an internet connection; all computing and data storage resources are provided by the CSP. Hard costs are spread among the customers accessing these shared services. This allows even start-ups and small businesses to leverage the power of the cloud to level the playing field against larger established competitors.

## GET YOUR HEAD IN THE CLOUD

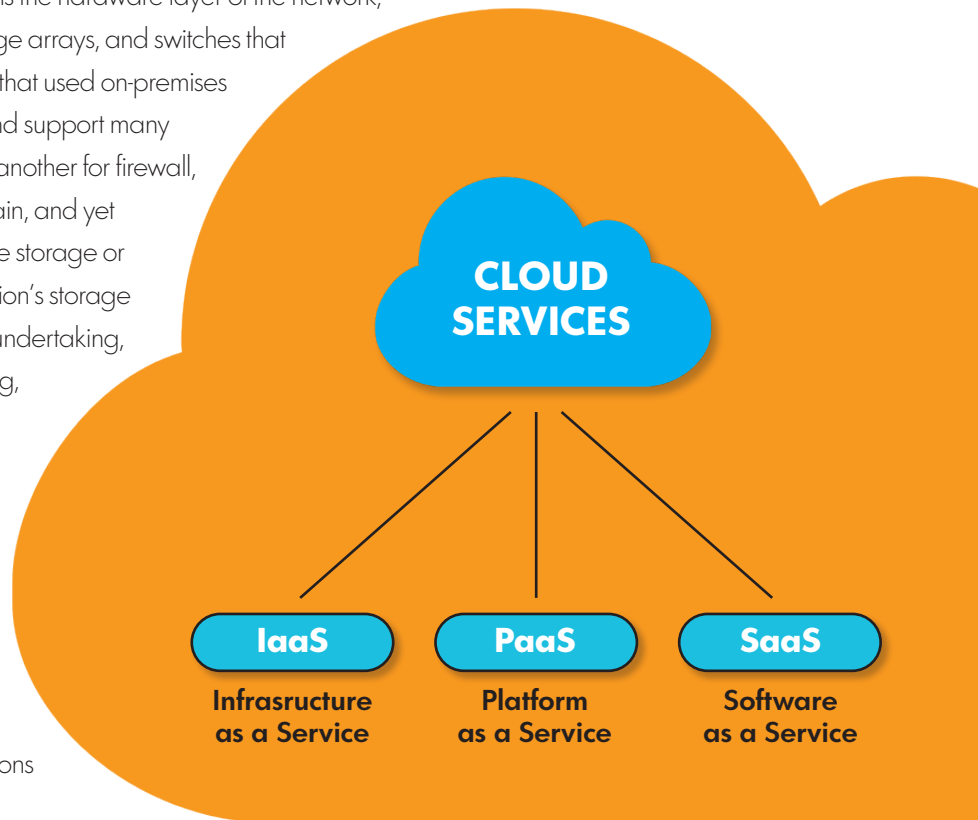
More than 90% of all businesses have migrated some aspect of their IT infrastructure to the cloud. Cloud-based services help organizations of all sizes increase agility, lower IT expenses, and scale quickly. Here are eight reasons why you should buy into the cloud:

1. **Reduced data center footprint.** Lower the cost of management and control by moving IT services off premises; reduce the cost of server upgrades by deploying virtual servers.
2. **Lower end user hardware and software licensing expenses.** Deploy thin clients to employees to access databases and software remotely rather than equip and periodically update end-user workstations with memory and applications.
3. **Your workforce, salesforce, or customer base is remote or going mobile.** Ensure “always on” connectivity and access to critical data from anywhere there is internet connectivity on any device.
4. **Agility and scalability.** Scale up or scale back capacity for specific services in sync with demand, minimizing IT costs through a pay-as-you-go approach.
5. **Improved application performance.** Reduce latency for a better customer experience by leveraging the power of edge computing through a CSP.
6. **Enhanced collaboration.** Allow teams to access, edit, and share documents anywhere, anytime, while ensuring everyone is working with the latest version.
7. **Disaster recovery.** All data and compute resources are safely stored off site and backed up by the CSP for fast recovery in the event of a power outage or natural disaster.
8. **Security and compliance.** The onus is on the CSP to ensure your data is protected from loss, theft, and falsification, and to maintain compliance with the latest security standards and updates to guard against cyber threats.

## TYPES OF CLOUD SERVICES

There are many different kinds of cloud services, but they are generally categorized into three high-level classes:

- **Infrastructure as a Service (IaaS):** This is the hardware layer of the network, meaning the servers, compute power, storage arrays, and switches that comprise the physical network. Companies that used on-premises data center models needed to purchase and support many different types of servers; one for voicemail, another for firewall, another for email, another for the supply chain, and yet another server for trouble ticketing. Separate storage or disk arrays were required for each application's storage needs—in sum a costly and tangibly large undertaking, with IT administrators responsible for installing, configuring, and updating, well, everything. About 20 years ago, VMware pioneered software that “virtualized” these previously separate physical servers. This dramatically impacted scalability while lowering costs, and enabled CSPs to virtually host the assets needed to run applications as a remote service. Today, AWS claims a 48% global market share in providing IaaS solutions to businesses.<sup>4</sup>



- **Platform as a Service (PaaS):** Platform services are used by application developers. They build on the infrastructure layer using middleware, business intelligence tools, and database management systems to write the code to deliver the functionality that each service requires. Standardized development tools automate tasks, parse data for trends and insights, and reduce coding time to speed the deployment of new capabilities and realize faster time to market. This could include updates to a company's ecommerce site for example, with enhanced catalog browsing, online ordering, and purchasing mechanisms. These are then linked to enterprise inventory management tools, ordering systems, shipping, fulfillment, billing, CRM systems, etc. Today, AWS claims a 25% global market share in providing PaaS solutions—developing, managing, and hosting applications—for cloud-based businesses.<sup>4</sup>
- **Software as a Service (SaaS):** This service removes the burden of purchasing, installing, and licensing software applications for every user on every device. The software is held in the cloud and purchased on a subscription basis. End-users simply login to the system and launch the desired application, ending worries of updates or incompatibilities. Files are presented to the user as if the app is running on their machine, but all processing and file storage is performed remotely. SaaS is excellent for start-ups and small firms that do not have resources to equip all employees with individual copies and licenses for Microsoft Office, Google Docs, Dropbox, video conferencing software, CRM applications, payroll, etc. SaaS is also appropriate for seasonal or short term needs like tax software. AWS provides a low cost, reliable, and secure foundation for businesses to build and deliver SaaS solutions to customers through the AWS marketplace.

## CLOUD IMPLEMENTATION CHOICES<sup>5</sup>

A mix of any or all of these services can be operated or accessed through a public cloud, a private cloud, or a hybrid strategy employing both public and private clouds.

- **Public cloud:** This usually refers to services offered by cloud providers for a fee. Businesses rent public cloud space to store their software and live application data apart from the enterprise's data center. The cloud provider manages all of the hardware from their own data centers or virtual infrastructure, freeing businesses from the costs of having to purchase, manage, and maintain on-premises storage hardware and software resources. Different cloud service providers offer different levels and types of data storage and compute resources, with scalability available on demand. One potential drawback with public cloud usage is that providers may store data in any location, which may cause high latency if data must travel farther across networks.
- **Private cloud:** This typically means both enterprise data and cloud resources are hosted on-premises within an organization's data center, behind the firewall. A private cloud strategy allows companies' internal IT teams to manage the cloud and control all aspects of network performance. Private clouds will have lower latency because all the servers are right there, not hundreds or thousands of miles away. Maintaining a private cloud helps resolve the potential for security and performance concerns while still offering many benefits of the public cloud such as scalability, reliability, and rapid deployment. However, as private cloud services are managed inside the data center, they almost always carry higher capital and maintenance costs as the enterprise is responsible for data center space, staffing, hardware, network connectivity, power, and cooling. Disaster recovery/back-up can also be much more challenging if all data is hosted at a single location.
- **Hybrid cloud:** A combination of public and private clouds, some critical data resides in the enterprise's on-premises private cloud, while other data is stored and accessed from one or more public cloud environments. Because workloads can be deployed either in a distant public cloud or on-premises, hybrid cloud environments are often more flexible. Businesses can decide where to store data depending upon their needs. Hybrid cloud storage is a good option for businesses that need low-latency, on-premise data storage, as well as scalable storage for large amounts of data that they don't access frequently. It provides the security and control they desire over mission critical workloads, and saves money by offloading the storage of non-critical data to a third party provider.



While Wave Business is not a cloud service provider, we do install, service, and monitor low latency, high quality, direct connections between enterprises and cloud service providers to improve how these services perform for their employees and ultimate end-users. We do this through a partnership with Amazon Web Services.

# AWS DIRECT CONNECT

## Why AWS?

While Wave plans to partner with several leading CSPs in the future, Wave has already been named as an **AWS Select Tier Consulting Partner**, able to install and support direct, high bandwidth fiber connections between enterprises in the markets we serve and the Amazon cloud.

Businesses, especially multinational and global enterprises, choose to partner with AWS because of the comprehensive access it provides them to the latest computing and storage resources. It is no accident there are hints of AWS dominance sprinkled throughout this discussion. AWS has the largest infrastructure footprint of any cloud provider, capable of delivering myriad low latency services through a worldwide dark fiber network of servers. AWS is ubiquitous, offering 24 regions and 76 availability zones globally, reaching hundreds of millions of users on a daily basis. This, in turn, makes it easier for businesses to reach their customers, making the decision to partner with AWS for cloud services an easy one.

AWS prides itself on rapid innovation; they are constantly deploying new services and upgrading existing ones. Today, AWS offers over 175 services, up from just 70 in 2017. In addition to Compute, Storage, Databases, Analytics, Networking, Mobile, Developer Tools, Management Tools, IoT, Security and Email services, AWS offers high bandwidth, scalable connections for enterprise-class services including:

- **Amazon Elastic Compute Cloud (EC2)** simplifies web-scale deployment through reliable, scalable infrastructure on demand. Easily scale up server and compute capacity in the cloud to handle peak period workloads. AWS offers a choice of Intel, AMD and ARM-based processors. (This is the service Netflix uses to store and distribute millions of titles around the globe).
- **Amazon Virtual Private Cloud (VPC)** provides advanced security, monitoring, and management, enabling enterprises to achieve complete control over their virtual networking environment. Logically define, segment, and isolate network sections and resources in a virtual network.
- **Amazon Simple Storage Service (S3)** stores and retrieves any amount of data from anywhere. It simplifies web-scale with immediate replication of files to multiple locations and auto-scales as needed.
- **Amazon DynamoDB** is a powerful yet flexible non-relational database service, offering single-digit millisecond latency at any scale with automatic replication. Featuring built-in security, backup and restore capabilities, and in-memory caching, it processes more than 20 million requests per second.

These and other services help organizations move faster, lower IT costs, and scale quickly. No contracts are required and customers can add or suspend services at any time.

## Did You Know?



Netflix is AWS's largest customer. Netflix

had spent years building its own private global network of micro data centers. The premise of using edge computing to deliver low latency video streaming services to subscribers proved correct, but the burden of maintaining the network was a major drain of cash and resources.

By 2015, Netflix had closed all of their data centers and moved 100% to AWS. Today, Netflix spends \$19 million per month on Amazon Elastic Compute Cloud services for web-scale delivery of video content. Imagine what they were spending to operate a private cloud!





## WHY AWS DIRECT CONNECT THROUGH WAVE?

Having established that one of the best way to access cloud services is through AWS, the question becomes, *why should businesses choose to partner with Wave to connect to AWS?*

There are two ways to connect to AWS: via a regular public cloud connection or a direct connection through a certified AWS partner.

For the former, all that is required is an internet connection to a data exchange platform (usually through a colocation facility), but the level of service will be equal to all other users of the public cloud. Depending upon the volume of data, public internet connections to the AWS cloud may struggle with latency and bandwidth, causing performance slowdowns.

With regard to the latter, businesses cannot deploy a private, direct connection to AWS. AWS is not in the business of installing and maintaining high bandwidth connectivity to all of its customers. Therefore, authorized internet service providers like Wave are required to install, monitor, and service the fiber connection(s) between the business and the nearest AWS access point.

**Wave's AWS Direct Connect Service establishes secure, private connectivity directly between an AWS node and the customer's environment—whether that is an office, data center, or colocation facility.**

A direct connection to AWS through Wave...

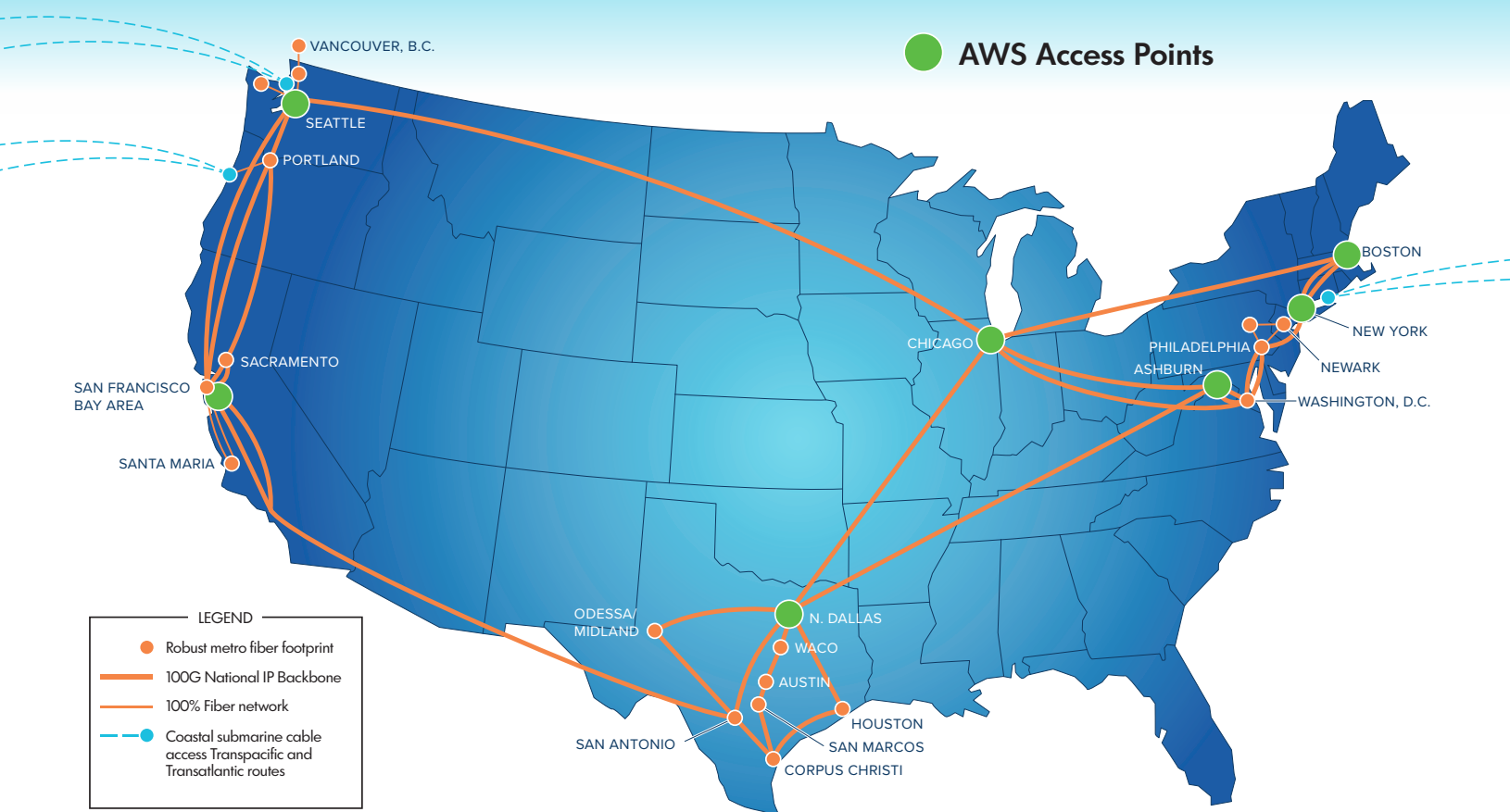
- **provides a bigger, cleaner pipeline to the AWS cloud.** This increases bandwidth and provides our customers with the fastest possible data transmission speeds, greater flexibility, and enhanced ease of use, all excellent advantages for enterprises processing Big Data.
- **reduces network latency.** Having applications and network requests respond in real time provides a better overall user experience. This is especially critical for time-sensitive applications involving AI/ML.
- **increases network security.** Enjoy extra protection against cyber threats as the connection is insulated from public internet traffic.
- **allows customers to connect to any AWS node.** AWS can route traffic anywhere on the AWS backbone, with multiple diverse circuits linking different global regions with redundancy.
- **enables easier disaster recovery.** Data and applications are safely stored off site, allowing businesses to quickly return systems to their last known state of safe operation.
- **provides a more consistent connection than over the internet.** Businesses are immune to jitter, latency, and service outages with 99.99% availability.
- **does not prevent businesses from adopting a hybrid cloud strategy.** Customers are free to maintain on-premises resources, or add connections to different clouds.



Wave maintains a robust national network, with high bandwidth fiber interconnection points into the AWS cloud network in several major markets and surrounding areas. Wave customers can connect to any AWS node, it doesn't have to be the closest connection point from their data center. In fact, Wave offers cross-connections to more than 100 data centers nationwide. That makes Wave a one-stop shop for enterprise and cloud connectivity featuring the leader in cloud computing, AWS.

Benefits to customers include:

- **Enhanced network performance.** All traffic between the enterprise and the AWS cloud is carried over a private, dedicated line that avoids the internet. The connection is secure, consistent, and offers low latency for real time performance.
- **Flexible connectivity.** Wave offers a choice of hosted or dedicated connections, with diversity options for redundancy and "always on" connectivity between the customer location and the data center. Wave's world-class support team will design and deploy a direct connection to the customer's AWS node of choice optimized for their environment.
- **Superior reliability.** The connection is private, secured against outside threats, and easily scalable to meet changing needs. SLAs from AWS guarantee at least 99.9% uptime for compute resources; Wave's connection SLA of 99.99% covers jitter, latency, MTTR, and packet loss from the customer location to the AWS port—together providing end-to-end protection. Wave's high net promoter scores (NPS) are testament to the superior, consistent quality of service we deliver.



## CHOOSE YOUR CONNECTION

Wave offers two types of connections directly to AWS, dedicated service and hosted service.

**Dedicated service** employs a physical Ethernet Private Line (EPL) connection from the data center to an AWS port in a choice of 1 GB or 10 GB bandwidths. A more expensive service, the dedicated connection is faster, private, and secure. Offering higher bandwidth, it is best for large enterprises that need access to powerful data processing AWS cloud services, but do not resell networking services. A customer ordering dedicated service must do so through the AWS portal, who then assigns deployment to an AWS Select Tier Consulting Partner in the originating market. Customers are responsible for the cost of the connection.

**Hosted service** provides a virtual Ethernet Private Line (EVPL) connection from the customer's enterprise data center or colocation through Wave's network-to-network interface to the AWS cloud in a choice from 50 MB to 500 MB bandwidths. Hosted service is a more cost effective option, and is best for lower bandwidth, smaller accounts with more transactional applications. Customers order a hosted connection to AWS directly through the Wave portal, which partitions segments of our own private direct AWS connection to each customer. As a shared service, Wave absorbs the connection cost (and handles most aspects of service and support on behalf of the customer).

The quality and reliability of the Wave direct connection into the AWS cloud is constant; the service is transparent to end-users no matter which one they choose, dedicated or hosted. Scale, bandwidth, and cost are the key criteria for customers, as outlined in the table below:

CATEGORY	DEDICATED SERVICE	HOSTED SERVICE
Wave Product	EPL	EVPL
Bandwidth Choices	1 GB, 10 GB	50 MB, 100 MB, 200 MB, 300 MB, 400 MB, 500 MB
Connection Type	Physical	Virtual
Customer Orders Via	AWS Portal	Wave
Letter of Agency (LOA)	AWS sends to Customer, who gives to Wave	Wave orders on AWS portal on behalf of customer (Customer AWS Account ID required)
Cross-Connect	Wave orders from Data Center	N/A
Billing: AWS Wave	Charges customer directly for port & egress Charges customer MRC for EPL and cross-connect	Charges customer directly for port & egress Charges customer MCR for EVPL





# WAVE AWS DIRECT CONNECT

## THE FASTEST WAY TO GET TO THE CLOUD

Don't just go to the cloud, go to the AWS cloud via Wave Direct Connect for the best possible performance, security and privacy, cost savings, and peace of mind. Talk to Wave to learn how and where you can connect directly to the AWS cloud to improve the quality of service you provide to end-users.

Visit [www.rcngrandewave.com/cloud/aws](http://www.rcngrandewave.com/cloud/aws) to learn more about the Wave and AWS partnership.

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### SOURCES & ACKNOWLEDGEMENTS

<sup>1</sup>451 Research, (Now part of S&P Global Market Intelligence), 451research.com

<sup>2</sup>What is the Cloud? [azure.microsoft.com/en-us/overview/what-is-the-cloud](https://azure.microsoft.com/en-us/overview/what-is-the-cloud)

<sup>3</sup>Cloud Adoption Statistics for 2020, by Nick Galov, [hostingtribunal.com](https://hostingtribunal.com), November 2020

<sup>4</sup>Statistica.com, Amazon Web Services, Statistics & Facts

<sup>5</sup>Cloud Storage Definition & Meaning, By Vangie Beal, [webopedia.com](https://webopedia.com)

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