

Service Name

AWS Wavelength

Service Overview

AWS Wavelength is an edge computing infrastructure service that deploys standard AWS compute and storage services to the edge of communications service providers' (CSP) 5G networks. It enables developers to build applications requiring ultra-low latency or edge resiliency by extending Virtual Private Cloud (VPC) to one or more Wavelength Zones. These zones are logical extensions of AWS Regions, managed by the control plane in the Region, allowing applications to serve mobile devices and end users with minimal network latency while maintaining seamless connectivity to full AWS Regional services.

Key Use Cases

- Real-time gaming: Game streaming with ultra-low latency to preserve user experience on devices with limited processing power
- Augmented and Virtual Reality: Reducing Motion to Photon (MTP) latencies for realistic AR/VR experiences in locations without local system servers
- Connected vehicles: Enabling Cellular Vehicle-to-Everything (C-V2X) functionality for intelligent driving, real-time HD maps, and autonomous driving capabilities
- Smart factories: Industrial automation using machine learning inference at the edge for quality control on assembly lines without expensive on-premise GPU servers
- Media and entertainment: Live streaming high-resolution video and audio with interactive experiences and real-time video analytics
- Healthcare: Medical training through mobile games, simulations, and advanced procedures using remote rendering engines
- Online betting and regulated industries: Edge resiliency for data residency requirements within state or country borders

Features

- **Data Sovereignty by Design:** Built according to AWS sovereign-by-design principles providing verifiable control over data location using AWS Nitro System architecture with hardware-based security and isolation
- **Compute Services:** Selection of EC2 instance families (T3, R5, M5, C5, G4) including g4dn.2xlarge with NVIDIA T4 GPUs for ML inference and small-scale training, plus EC2 Auto Scaling
- **Storage Services:** Amazon EBS gp2 volumes for persistent block storage with snapshot and restore capabilities, plus volume size increases without performance impact

- **Container Services:** Support for Amazon EKS and ECS clusters to run Kubernetes and containerized workloads in Wavelength Zones
- **Load Balancing:** Application Load Balancer available in select Wavelength Zones for distributing traffic across multiple targets
- **Carrier Gateway:** Enables connectivity from Wavelength subnet to CSP network, internet, and AWS Region while filtering malicious threats
- **Regional Service Access:** Seamless connection to full range of AWS Regional services like S3 and DynamoDB through same APIs over high-bandwidth network backbone
- **AWS Management Tools:** Support for familiar AWS tools including CloudFormation, CloudWatch, CloudTrail, Systems Manager, and Cost Explorer

Value Proposition

AWS Wavelength uniquely positions compute resources at the edge of 5G networks within telecommunications providers' facilities, delivering ultra-low latency that cannot be achieved with traditional cloud deployments. Unlike other edge solutions, Wavelength offers the full AWS ecosystem with consistent APIs, tools, and services while meeting data residency requirements:

- The service eliminates the need for expensive on-premises infrastructure by leveraging carrier partnerships, providing automatic scaling, built-in security, and seamless integration with Regional AWS services
- This makes it ideal for latency-critical applications like real-time gaming, AR/VR, autonomous vehicles, and industrial automation where milliseconds matter

Service Integration

AWS Wavelength integrates seamlessly with core AWS services through high-bandwidth connections to parent AWS Regions. Primary integrations include Amazon EC2 instances and Auto Scaling, Amazon EBS volumes, Amazon VPC subnets and security groups, Amazon EKS and ECS for containers, and Application Load Balancer in select zones:

- Regional services like Amazon S3, DynamoDB, and RDS are accessible through the same APIs and SDKs
- Management services include Amazon CloudWatch for monitoring, AWS CloudTrail for auditing, AWS CloudFormation for infrastructure as code, and AWS Systems Manager for instance management
- The carrier gateway component provides secure connectivity to telecommunications networks while maintaining access to the full AWS ecosystem

Onboarding and Offboarding

Customers begin by opting into Wavelength Zones through the EC2 Dashboard, ensuring they can create necessary resources in the desired Region and reviewing quotas. The

setup process involves creating a VPC, configuring a carrier gateway, and establishing subnets in both Availability Zones and Wavelength Zones:

- Instances can be launched in Wavelength zones with Carrier IP addresses either auto-assigned or manually allocated
- Network configuration includes security group rules and route table customization
- Testing connectivity between Regional and Wavelength instances, as well as carrier network connectivity, validates the deployment
- The process uses familiar AWS tools including Management Console, AWS CLI, and SDKs for consistent operational experience

Getting Started Guide:

<https://docs.aws.amazon.com/wavelength/latest/developerguide/get-started-wavelength.html>

Data Removal

Data removal from AWS Wavelength follows standard AWS practices for associated services. Customers terminate EC2 instances, delete EBS volumes and snapshots, remove VPC components including subnets and carrier gateways, and delete any container clusters. Since Wavelength integrates with Regional services, data stored in services like S3 or DynamoDB must be removed from those services separately. All resources are managed through standard AWS APIs and console interfaces, ensuring consistent deletion processes across the platform.

Backup/Restore and Disaster Recovery

AWS Wavelength relies on standard AWS backup mechanisms for each integrated service. EBS volumes support snapshots stored in the parent AWS Region, providing point-in-time recovery capabilities. AMIs are also stored regionally for instance recovery. However, Wavelength itself does not provide specific disaster recovery features - customers must architect resilient solutions using multiple Wavelength Zones, Regional failover patterns, or integration with services like AWS Backup for centralized backup management across their infrastructure.

Backup Capabilities

AWS Wavelength supports backup through its constituent services rather than as a dedicated backup service. EBS volumes in Wavelength Zones can be backed up using EBS snapshots stored in the parent Region:

- The service works with AWS Backup for centralized backup policy management where applicable
- AMIs created from Wavelength instances are stored regionally, enabling instance recovery and replication across zones and regions as needed

Disaster Recovery

AWS Wavelength does not directly integrate with AWS Elastic Disaster Recovery as a standalone service. Instead, disaster recovery must be architected using multiple Wavelength Zones within VPCs, combining with Regional resources, or implementing hub-and-spoke models with the parent Region for failover. Customers can design highly available architectures by distributing applications across multiple Wavelength Zones and implementing DNS-based failover using Route 53 health checks.

Recovery Objectives

AWS Wavelength helps customers meet RPO and RTO objectives through its integration with AWS Regional services and backup mechanisms. EBS snapshots provide point-in-time recovery for data protection, while AMI storage in Regions enables rapid instance deployment. Customers can design architectures with multiple Wavelength Zones for redundancy, implement automated scaling for availability, and use DNS failover for rapid traffic redirection to meet specific recovery time requirements.

Service Constraints

Service Quotas:

<https://docs.aws.amazon.com/wavelength/latest/developerguide/wavelength-quotas.html>

FAQ: <https://aws.amazon.com/wavelength/faqs/>

Technical Requirements

Service Documentation:

<https://docs.aws.amazon.com/wavelength/latest/developerguide/what-is-wavelength.html>

User Guide: <https://docs.aws.amazon.com/wavelength/latest/developerguide/get-started-wavelength.html>

API Reference: <https://docs.aws.amazon.com/AWSEC2/latest/APIReference/>

Pricing Overview

Please see the AWS UK G Cloud 15 Pricing Document accompanying this service in the Digital Marketplace.

Public Pricing: <https://aws.amazon.com/wavelength/pricing/>

Cost Optimization

AWS Wavelength offers unique cost optimization through on-demand pricing models with EC2 Instance Savings Plans applicability, eliminating upfront infrastructure investments

typically required for edge deployments. Cost efficiency comes from leveraging shared telecommunications infrastructure rather than deploying dedicated edge hardware:

- Customers can optimize costs by right-sizing instance types based on workload requirements, using the limited but sufficient instance family options available, and architecting applications to minimize data transfer between Wavelength Zones and Regions
- The hub-and-spoke model with Regional services allows cost-effective resource sharing while maintaining edge performance benefits

Savings Considerations

Primary cost savings stem from avoiding expensive on-premises edge infrastructure deployment and maintenance costs, particularly for GPU-intensive workloads using g4dn instances instead of dedicated hardware. Shared carrier infrastructure reduces operational overhead while providing enterprise-grade connectivity:

- Instance Savings Plans can reduce compute costs, and strategic architectural decisions like processing data locally in Wavelength Zones before sending results to Regional services minimize data transfer costs
- The elimination of physical hardware procurement, maintenance contracts, and dedicated facility requirements for edge computing represents significant capital and operational expenditure reductions for latency-sensitive applications