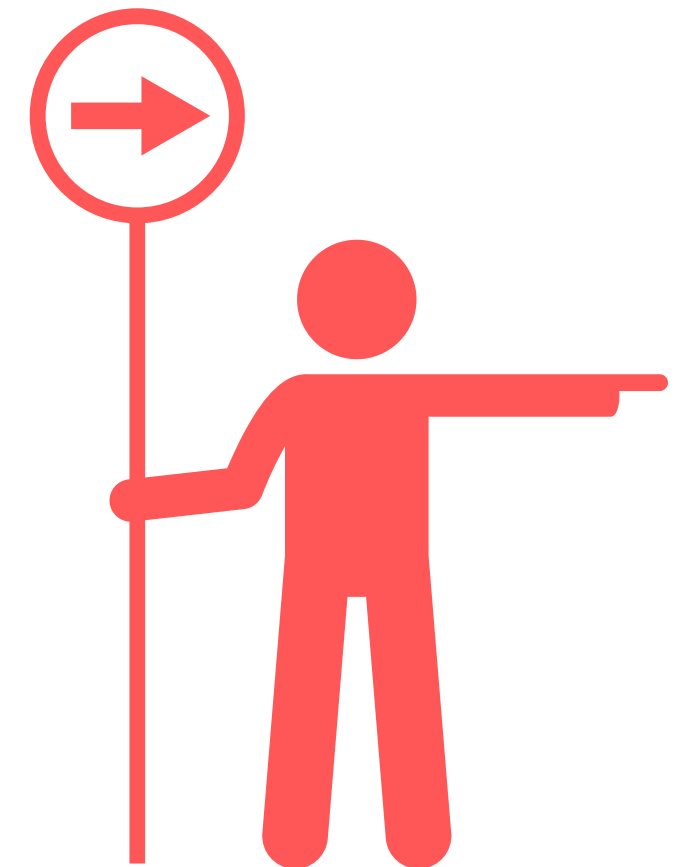


# AWS VPC



# Subnet annotations like /32, /24, /16, /8 used in networking and VPC configuration



CIDR Notation	Subnet Mask	Number of Addresses	Usable Addresses	Purpose
/32	255.255.255.255	1 address	0 (only identifies a single host)	Used for identifying a single device or endpoint (e.g., loopback or host route).
/31	255.255.255.254	2 addresses	0 (used for point-to-point links)	Used for point-to-point links (e.g., connecting routers).
/30	255.255.255.252	4 addresses	2	Suitable for small subnets, often for WAN links or test setups.
/29	255.255.255.248	8 addresses	6	Used in small network configurations like firewalls or switches.
/28	255.255.255.240	16 addresses	14	Common for small business networks, subnets for VMs or containers.
/27	255.255.255.224	32 addresses	30	Used for medium-sized subnets or internal applications.
/26	255.255.255.192	64 addresses	62	Good for larger networks with multiple devices or servers.
/25	255.255.255.128	128 addresses	126	Often used for specific zones within a corporate network.
/24	255.255.255.0	256 addresses	254	Very common for larger local area networks (LANs).
/23	255.255.254.0	512 addresses	510	Combines two /24 subnets, useful for expanding networks.
/22	255.255.252.0	1,024 addresses	1,022	Used for large-scale networks like ISPs or public-facing systems.
/21	255.255.248.0	2,048 addresses	2,046	Suitable for enterprise-level networks.
/16	255.255.0.0	65,536 addresses	65,534	Common for creating a VPC in AWS, covering a large range.
/8	255.0.0.0	16,777,216 addresses	16,777,214	Covers an entire Class A network, used rarely in specific cases.

## Understanding 172.31.0.0/16

Type	Address
Network Address	172.31.0.0
First Usable IP Address	172.31.0.1
Last Usable IP Address	172.31.255.254
Broadcast Address	172.31.255.255
Total Usable IPs	65,534

## 1. What is AWS VPC?

AWS VPC (Virtual Private Cloud) is a logically isolated network within AWS where you can deploy and manage your cloud resources securely. It is akin to having your private data center in the cloud, allowing you full control over your network settings.

## 2. Why Do We Need AWS VPC?

### 1. Isolation and Security:

- Provides a private network environment to host resources.
- Controls inbound and outbound traffic using security groups and network ACLs.

### 2. Customization:

- Design custom IP address ranges, subnets, and route tables.
- Allows segmentation of resources into private and public subnets.

### 3. Hybrid Cloud:

- Connects your on-premises infrastructure to AWS using VPN or Direct Connect.

### 4. Scalability:

- Enables seamless scaling of resources while maintaining network architecture.

### 5. Integration:

- Supports AWS services like EC2, RDS, EKS, and Lambda.

## 3. Key Components of a VPC

Component	Description
<b>CIDR Block</b>	Defines the IP address range for your VPC (e.g., 10.0.0.0/16).
<b>Subnets</b>	Divides the VPC into smaller networks (public or private).
<b>Internet Gateway</b>	Enables internet access for resources in public subnets.
<b>NAT Gateway</b>	Allows private subnet resources to access the internet without being exposed.
<b>Route Tables</b>	Directs network traffic within the VPC and to external destinations.
<b>Security Groups</b>	Acts as a virtual firewall for resources, controlling inbound and outbound traffic.
<b>Network ACLs</b>	Controls traffic at the subnet level, allowing or denying specific IP ranges or protocols.
<b>VPC Peering</b>	Connects two VPCs privately across AWS accounts or regions.
<b>Endpoints</b>	Allows private access to AWS services without going through the internet.



## 4. Purpose of AWS VPC



### 1. Private Hosting Environment:

- Host critical applications, databases, or services in a secure environment.

### 2. Control Over Networking:

- Fine-tune networking rules and configurations to meet specific application needs.

### 3. High Availability and Disaster Recovery:

- Deploy resources across multiple availability zones (AZs) for redundancy.

### 4. Cost Efficiency:

- Reduces costs by eliminating the need for physical hardware and infrastructure.

### 5. Secure Hybrid Cloud Setup:

- Extend your on-premises network to AWS securely using VPN or Direct Connect.

## 5. Technical Examples of VPC Usage

### a. Example 1: Hosting a Web Application

#### **Public Subnet:**

- Host an EC2 instance running a web server.
- Connect to the internet using an Internet Gateway.

#### **Private Subnet:**

- Host an RDS database instance accessible only by the web server.
- Connect to the internet using a NAT Gateway for updates.

### b. Example 2: Hybrid Cloud with VPN

- Connect your on-premises data center to AWS VPC using a VPN Gateway.
- Applications hosted in the VPC can communicate securely with on-premises systems.



## 6. Steps to Create a VPC in AWS

### a. Log in to AWS Console

1. Navigate to Services > VPC.

### b. Create a VPC

1. Click Create VPC.
2. Choose a name and specify:
  - IPv4 CIDR Block: e.g., 10.0.0.0/16.
  - IPv6 CIDR Block (optional).
  - Tenancy: Default (shared hardware) or Dedicated (single-tenant hardware).

## 6. Steps to Create a VPC in AWS

### c. Add Subnets

#### 1. Click Subnets and create:

- A public subnet with a CIDR range like 10.0.1.0/24.
- A private subnet with a CIDR range like 10.0.2.0/24.

### d. Configure an Internet Gateway

#### 1. Create an Internet Gateway.

#### 2. Attach it to your VPC.

## 6. Steps to Create a VPC in AWS

### e. Set Up Route Tables

1. Create a Route Table for public subnets:
  - Add a route for 0.0.0.0/0 pointing to the Internet Gateway.
2. Create a separate route table for private subnets (optional).

### f. Launch Resources

1. Launch EC2 instances and assign them to appropriate subnets.
2. Configure security groups to allow traffic.

## 8. Comparing On-Premises Networking and AWS VPC

Aspect	On-Premises Networking	AWS VPC
Setup Time	Weeks or months	Minutes to hours
Infrastructure Costs	High upfront costs for hardware and maintenance	Pay-as-you-go pricing for resources
Scalability	Limited by physical hardware	Seamlessly scalable
Security	Physical and network firewalls	Software-defined security (NACLs, Security Groups)
Disaster Recovery	Requires redundant data centers	Multi-AZ deployment with built-in high availability
Customization	Fully customizable but requires technical expertise	Easy-to-use tools for network customization



# THANK YOU FOR WATCHING!

Reach out for any questions.



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