**AWS Networking Documentation**

## ***1. Virtual Private Cloud (VPC)***

A **Virtual Private Cloud (VPC)** is a logically isolated network within AWS that enables users to launch and manage cloud resources securely. It provides control over IP addressing, subnets, routing, and internet connectivity.

### ***Key Features:***

* Define custom **IP address ranges (CIDR blocks)**.
* Segregate network resources using **subnets**.
* Control inbound and outbound traffic with **Security Groups and Network ACLs**.
* Connect to the internet, other AWS services, or on-premises networks.

## *2. Subnets*

A **Subnet** is a smaller network within a VPC that divides resources for better management and security.

### ***Types of Subnets:***

* **Public Subnet:** Directly accessible from the internet (e.g., for web servers).
* **Private Subnet:** No direct internet access (e.g., for databases and backend services).

### ***Example CIDR Blocks:***

* Public Subnet: 10.0.1.0/24
* Private Subnet: 10.0.2.0/24

## *3. Route Tables*

A **Route Table** contains rules (routes) that determine how network traffic is directed within the VPC.

### ***Route Table Configurations:***

* **Public Route Table:**
  + Route: 0.0.0.0/0 → **Internet Gateway**
  + Associated with **Public Subnet**
* **Private Route Table:**
  + No internet route (keeps resources internal)
  + Associated with **Private Subnet**

## *4. Internet Gateway (IGW)*

An **Internet Gateway (IGW)** allows resources in a **Public Subnet** to communicate with the internet.

### ***Key Points:***

* Must be attached to the **VPC**.
* Requires **route table configuration** to direct traffic.
* Only **Public Subnets** can route through an IGW.

## *5. Step-by-Step Setup Guide*

### **Step 1: Create a VPC**

1. Open **AWS Console → VPC Dashboard**.
2. Click **Create VPC**.
3. Enter **VPC Name** (e.g., MyVPC).
4. Set **CIDR Block** (e.g., 10.0.0.0/16).
5. Click **Create VPC**.

### ***Step 2: Create Subnets***

#### **Create a Public Subnet:**

1. Navigate to **VPC → Subnets → Create Subnet**.
2. Select **MyVPC**.
3. Enter **Subnet Name** (Public-Subnet).
4. Assign **CIDR Block** (10.0.1.0/24).
5. Choose **Availability Zone (AZ)**.
6. Click **Create Subnet**.

#### **Create a Private Subnet:**

1. Follow the same steps as above.
2. Use a different **CIDR Block** (10.0.2.0/24).
3. Name it **Private-Subnet**.

### ***Step 3: Create an Internet Gateway (IGW)***

1. Go to **VPC → Internet Gateways**.
2. Click **Create Internet Gateway**.
3. Name it **MyIGW**.
4. Click **Attach to VPC** and select **MyVPC**.

### ***Step 4: Configure Route Tables***

#### **Public Route Table:**

1. Navigate to **VPC → Route Tables → Create Route Table**.
2. Name it **Public-RT** and associate it with **MyVPC**.
3. Click **Edit Routes → Add Route**:
   * **Destination:** 0.0.0.0/0
   * **Target:** Select **Internet Gateway (MyIGW)**.
4. Click **Save** and **Associate Public-Subnet**.

#### **Private Route Table (Optional):**

1. Create a **Private-RT** and associate it with **MyVPC**.
2. Do **not** add an internet route.
3. Associate it with **Private-Subnet**.

## *6. Summary Table*

|  |  |  |
| --- | --- | --- |
| **Component** | **Purpose** | **Configuration** |
| **VPC** | Isolated network in AWS | CIDR: 10.0.0.0/16 |
| **Public Subnet** | Allows internet access | CIDR: 10.0.1.0/24 |
| **Private Subnet** | Internal-only communication | CIDR: 10.0.2.0/24 |
| **Route Table (Public)** | Routes traffic to the internet | 0.0.0.0/0 → IGW |
| **Route Table (Private)** | Internal communication only | No internet route |
| **Internet Gateway** | Enables internet access | Attached to VPC |

## *7. Conclusion*

By following this guide, you have successfully:

* Created a **VPC with subnets**.
* Configured **route tables** for public and private networks.
* Attached an **Internet Gateway** for external connectivity.

This setup is foundational for deploying AWS resources with proper **network segmentation and security**.

