Introduction to VPC

What is VPC?

- Amazon Virtual Private Cloud (Amazon VPC) is a logically isolated area of the AWS cloud where you can launch AWS resources in a virtual network that you define.
- So, VPC provides much better security control over your AWS resources.
- This virtual network closely resembles a traditional network that you'd operate in your own data center, with the benefits of using the scalable infrastructure of AWS.

VPC Basic Components

- VPC Region&AZ
- VPC Subnets
- VPC CIDR
- Internet Gateway
- Route Table and Router
- Security Group and Network ACL

Region, AZ and Subnets

Region is a physical location around the world. AWS Region consists of multiple, isolated, and physically separate AZ's where data centers are loacated.

VPC is a isolated virtual network located in a single region.

A subnet is a logical partition of an IP network into VPC. There are two types of subnets; Public Subnet and Private Subnet.

Region, AZ and Subnets

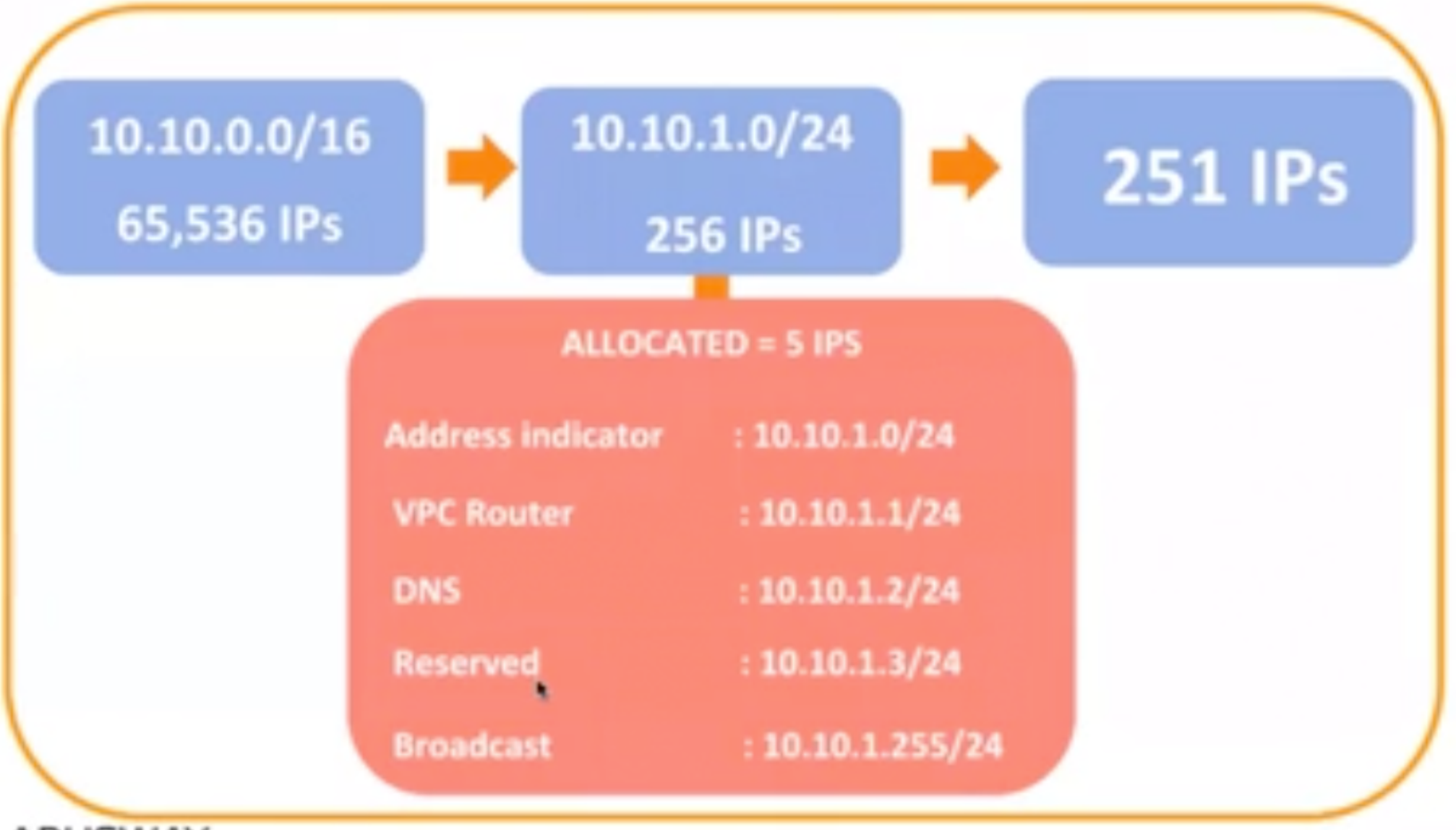
VPC CIDR

10.0.0.0/16= **65,536** IPs in Range
10.0.1.0/24= **256** IPs in Range
10.0.1.0/32= **1** IP in Range

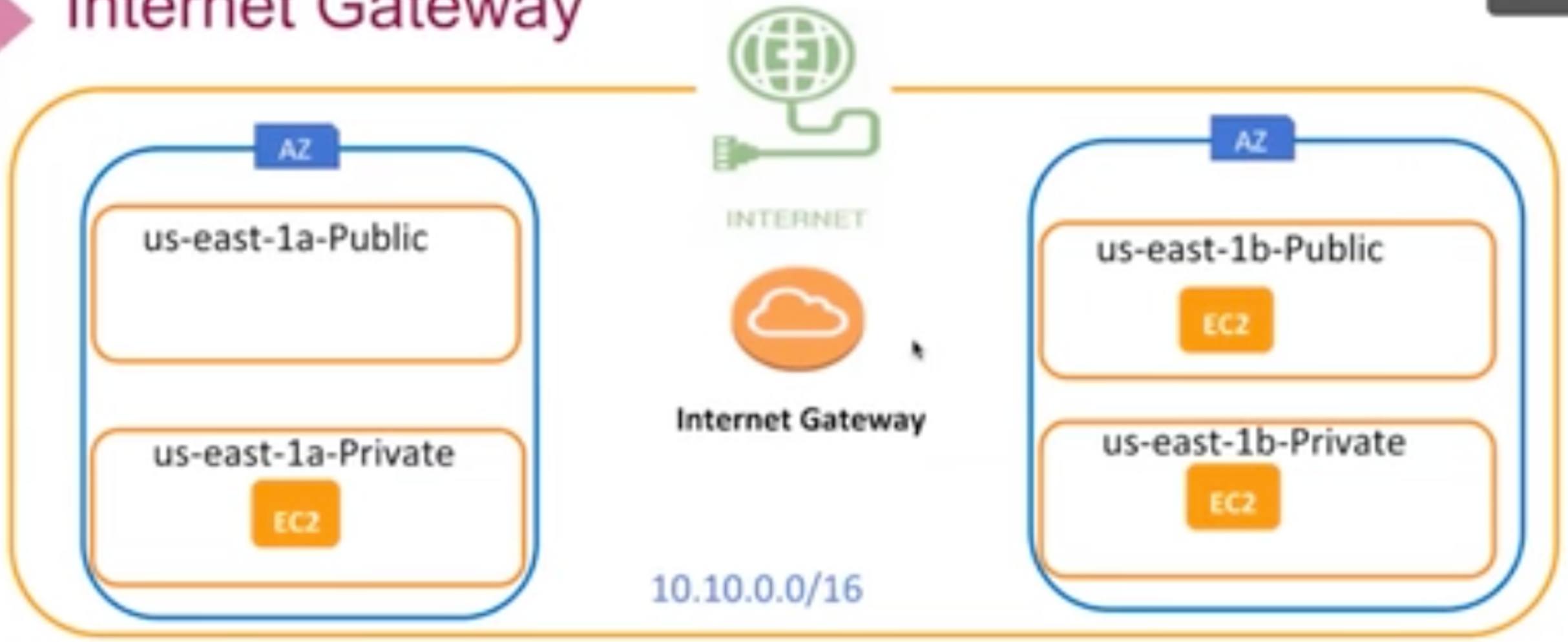
- CIDR refers to Classless Inter-Domain Routing.
- It is a set of Internet protocol (IP) standards that is used to create unique identifiers for networks.
- When you create a VPC, you must specify a range of IPv4 addresses for the VPC in the form of a Classless Inter-Domain Routing (CIDR) block.
- As the Size Block (/16,24,32) increases, the number of IP located in CIDR Block decreases.

https://mxtoolbox.com/subnetcalculator.aspx

VPC CIDR


10.10.0.0/16
65,536 IPs
10.10.1.0/24
256 IPs
251 IPs
ALLOCATED = 5 IPS
Address indicator : 10.10.1.0/24
VPC Router : 10.10.1.1/24
DNS : 10.10.1.2/24
Reserved : 10.10.1.3/24
Broadcast : 10.10.1.255/24

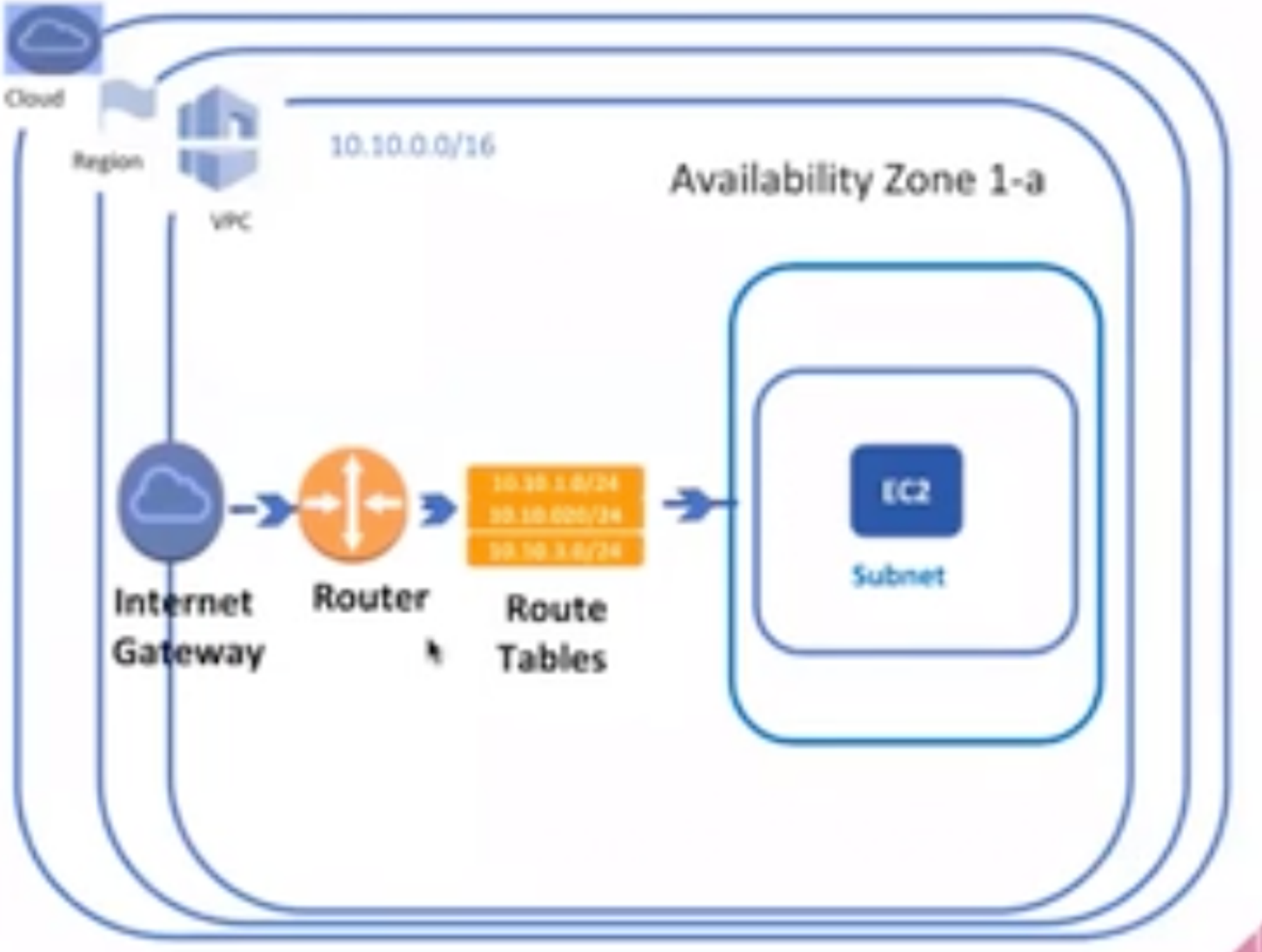
Internet Gateway



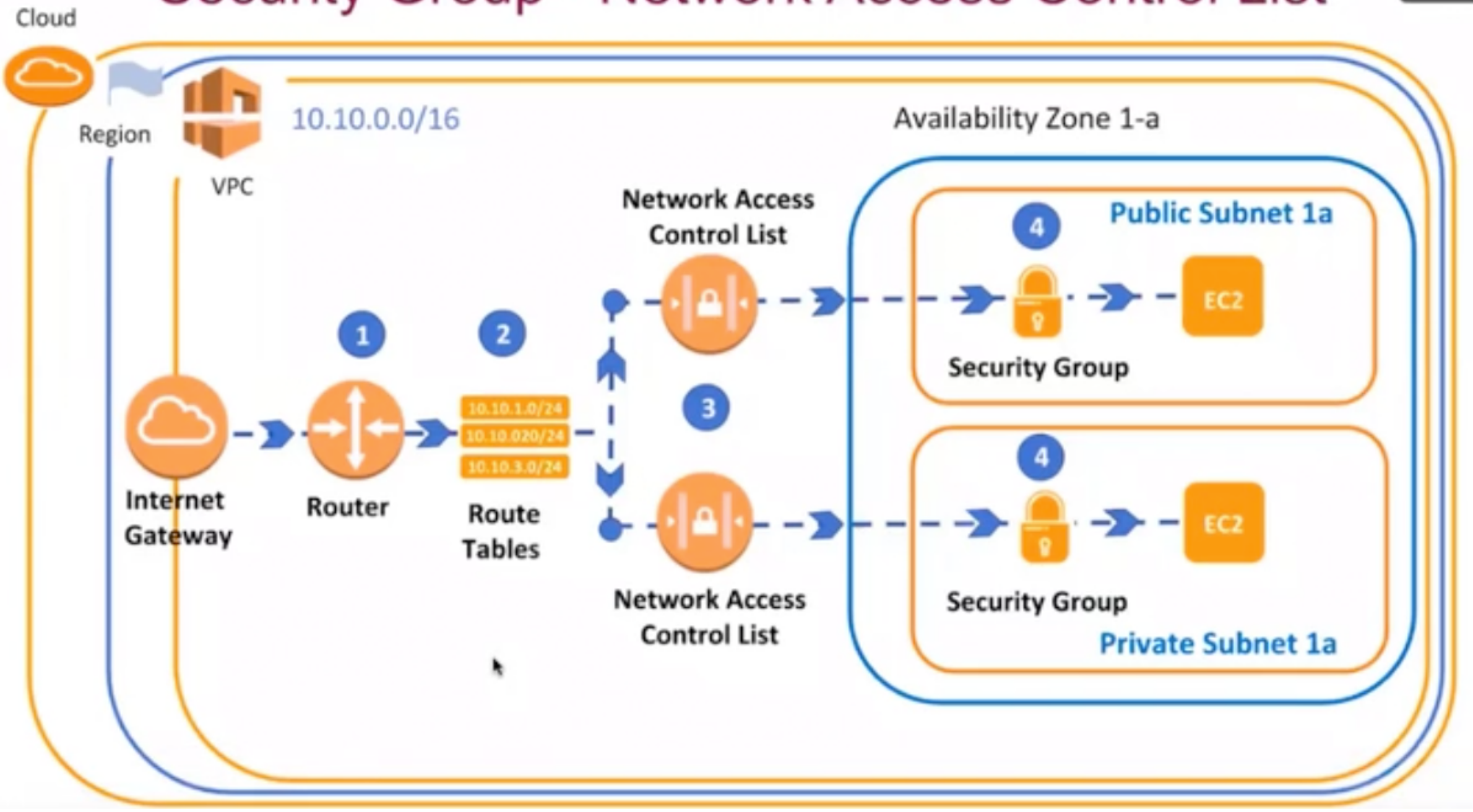
- Internet Gateway is a VPC component that provides communication between instances in your VPC and the internet.

Route Table and Router

- Route Table is a set of rules, that is used to determine where VPC traffic is directed.
- Routers are components that manage the Route Tables and they act as "intersections" within the network.



Security Group - Network Access Control List



Network ACLs & Security Groups

- Network ACLs are subnet-based security components.
- It controls the traffic in and out of subnets.

- Security Groups are instance-based security components,
- They are used for determining which traffic will access the instance.

- Instance in subnet is affected by rules of both Security Groups and Network ACLs

	Security Group 	Network Access Control List 
Rules	It supports only **Allow Rules**	It supports **both Allow and Deny** rules
Default by AWS	By default, **inbound** rules are **Denied, outbound** rules are **Allow**	By default, all the rules are **Allowed**
* **Newly Created by User**	By default, **inbound** rules are **Denied, outbound** rules are **Allow**	By default, all the rules are **Denied*** until you add rules.
Add Rule	You need to add the rule which you'll **Allow**	You need to add the rule which you can **either Allow or Deny it**.
Stateful/Stateless	It is a **Stateful** means that any changes made in the inbound rule will be automatically reflected in the outbound rule	It is a **Stateless** means that any changes made in the inbound rule will not reflect the outbound rule
Association	1. It is **instance-based** 2. Instances can associate with **more than one** Security Groups	1. It is **subnet-based** 2. Subnets can **associate with only one** Network ACL

Network Access Control List

PC IP: 7.8.9.10/32

Connection Request	
No	Type-Port
1	SSH-22

Security Group Inbound

Type	Protocol	Port Range	Source
HTTP	TCP(6)	80	1.2.3.4/32
SSH-22	TCP(6)	22	0.0.0.0/0
HTTPS	TCP(6)	443	7.8.9.10/32

Subnet

Network ACL Inbound

Rule	Type	Protocol	Port Range	Source/ Destination	Allow/ Deny
100	HTTP	TCP(6)	80	7.8.9.10/32	ALLOW
200	SSH-22	TCP(6)	22	0.0.0.0/0	ALLOW
*	ALL Traffic	ALL	ALL	0.0.0.0/0	DENY

Use Ephemeral Port in Outbound