

What is Azure Virtual Network?

- **Azure Virtual Network (VNet)** is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as **Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks**. VNet is similar to a traditional network that you'd operate in your own data center but brings with it additional benefits of Azure's infrastructure such as **scale, availability, and isolation**.
- Link : <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-overview>

Why use an Azure Virtual network?

- Azure virtual network enables Azure resources to securely communicate with each other, the internet, and on-premises networks. Key scenarios that you can accomplish with a virtual network include - communication of Azure resources with the internet, communication between Azure resources, communication with on-premises resources, filtering network traffic, routing network traffic, and integration with Azure services.

Azure Vnet Communicate with the internet

- All resources in a VNet can communicate outbound to the internet, by default. You can communicate inbound to a resource by **assigning a public IP address or a public Load Balancer**. You can also use **public IP or public Load Balancer to manage your outbound connections**. To learn more about outbound connections in Azure, see [Outbound connections](#), [Public IP addresses](#), and [Load Balancer](#).

Azure Vnet Communicate between Azure resources

- Azure resources communicate securely with each other in one of the following ways:
- **Through a virtual network:** You can deploy VMs, and several other types of Azure resources to a virtual network, such as Azure App Service Environments, the Azure Kubernetes Service (AKS), and Azure Virtual Machine Scale Sets. To view a complete list of Azure resources that you can deploy into a virtual network, see [Virtual network service integration](#).
- **Through a virtual network service endpoint:** Extend your virtual network private address space and the identity of your virtual network to Azure service resources, **such as Azure Storage accounts and Azure SQL Database, over a direct connection**. Service endpoints allow you to secure your critical Azure service resources to only a virtual network. To learn more, see [Virtual network service endpoints overview](#).
- **Through VNet Peering:** You can connect virtual networks to each other, enabling resources in either virtual network to communicate with each other, using virtual network peering. The virtual networks you connect can be in the same, or different, Azure regions. To learn more, see [Virtual network peering](#).

Azure Vnet :Deploy dedicated Azure services into virtual networks

- Link : <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-network-for-azure-services>

Azure Vnet Communicate with on-premises resources

- You can connect your on-premises computers and networks to a virtual network using any combination of the following options:
- **Point-to-site virtual private network (VPN):** Established between a virtual network and a single computer in your network. Each computer that wants to establish connectivity with a virtual network must configure its connection. This connection type is great if you're just getting started with Azure, or for developers, because it requires little or no changes to your existing network. The communication between your computer and a virtual network is sent through an encrypted tunnel over the internet. To learn more, see [Point-to-site VPN](#).
- **Site-to-site VPN:** Established between your on-premises VPN device and an Azure VPN Gateway that is deployed in a virtual network. This connection type enables any on-premises resource that you authorize to access a virtual network. The communication between your on-premises VPN device and an Azure VPN gateway is sent through an encrypted tunnel over the internet. To learn more, see [Site-to-site VPN](#).
- **Azure ExpressRoute:** Established between your network and Azure, through an ExpressRoute partner. This connection is private. Traffic does not go over the internet. To learn more, see [ExpressRoute](#).

Azure Vnet Filter network traffic

- You can filter network traffic between subnets using either or both of the following options:
- **Network security groups:** Network security groups and application security groups can contain multiple inbound and outbound security rules that enable you to filter traffic to and from resources by source and destination IP address, port, and protocol. To learn more, see [Network security groups](#) or [Application security groups](#).
- **Network virtual appliances:** A network virtual appliance is a VM that performs a network function, such as a firewall, WAN optimization, or other network function. To view a list of available network virtual appliances that you can deploy in a virtual network, see [Azure Marketplace](#).

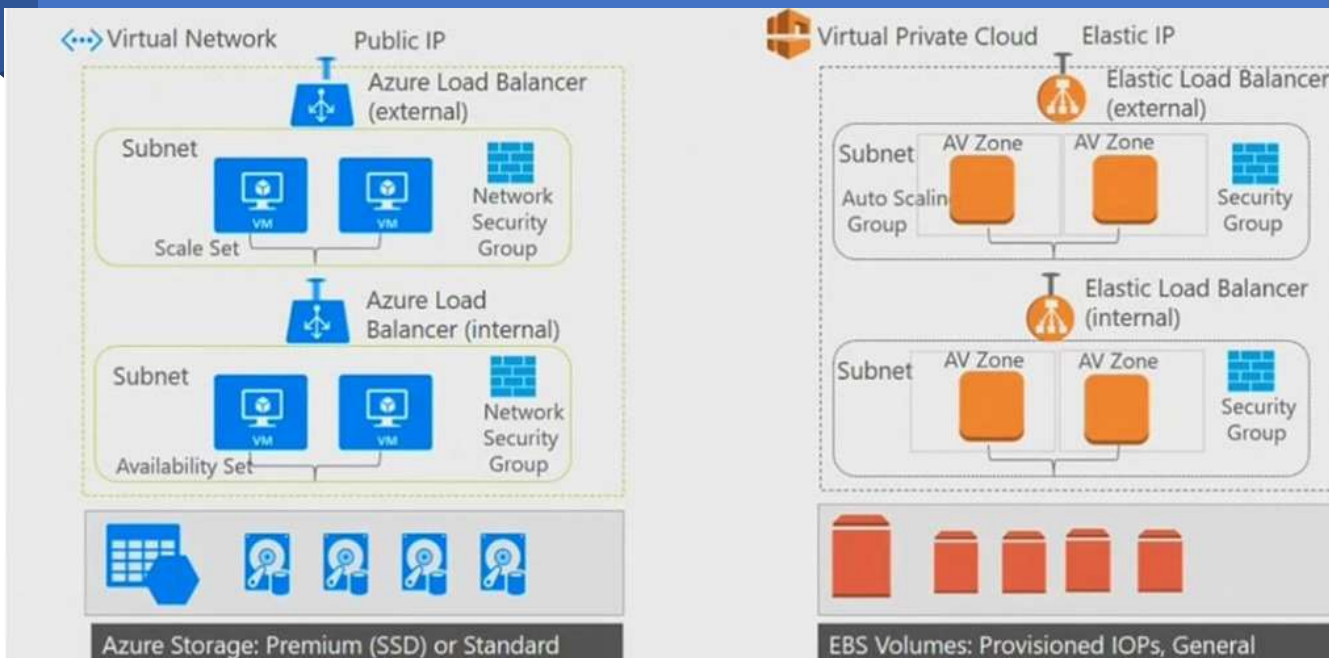
Azure Vnet Route network traffic

- Azure routes traffic between subnets, connected virtual networks, on-premises networks, and the Internet, by default. You can implement either or both of the following options to override the default routes Azure creates:
- **Route tables:** You can create custom route tables with routes that control where traffic is routed to for each subnet. Learn more about [route tables](#).
- **Border gateway protocol (BGP) routes:** If you connect your virtual network to your on-premises network using an Azure VPN Gateway or ExpressRoute connection, you can propagate your on-premises BGP routes to your virtual networks. Learn more about using BGP with [Azure VPN Gateway](#) and [ExpressRoute](#).

More Details of Azure Vnet

- Link : <https://docs.microsoft.com/en-us/learn/modules/introduction-to-azure-virtual-networks/2-explore-azure-virtual-networks>

AWS VPC and Azure Vnet



- **Link :** <https://devblogs.microsoft.com/premier-developer/differentiating-between-azure-virtual-network-vnet-and-aws-virtual-private-cloud-vpc/>

Understanding IPv4 and IPv6 Protocol Family

- IPv4 addresses are 32-bit numbers that are typically displayed in dotted decimal notation and contains two primary parts: the network prefix and the host number. The topics below describes the IPv4 Classful Addressing, IPv4 Dotted Decimal Notation, IPv4 Subnetting, IPv4 Variable-Length Subnet Masks.
- The ongoing expansive growth of the Internet and the need to provide IP addresses to accommodate it—to support increasing numbers of new users, computer networks, Internet-enabled devices, and new and improved applications for collaboration and communication—is escalating the emergent use of a new IP protocol. IPv6, with its robust architecture, was designed to satisfy these current and anticipated near future requirements.
- IPv6 addresses consist of 128 bits, instead of 32 bits, and include a scope field that identifies the type of application suitable for the address. IPv6 does not support broadcast addresses, but instead uses multicast addresses for broadcast. In addition, IPv6 defines a new type of address called anycast.

➤ **IPv4** : IP stands for **Internet Protocol** and **v4** stands for **Version Four (IPv4)**. IPv4 was the primary version brought into action for production within the ARPANET in 1983. IP version four addresses are 32-bit integers which will be expressed in decimal notation. Example- 192.0.2.126 could be an IPv4 address.

➤ **Parts of IPv4**

• **Network part:**

The network part indicates the distinctive variety that's appointed to the network. The network part conjointly identifies the category of the network that's assigned.

• **Host Part:**

The host part uniquely identifies the machine on your network. This part of the IPv4 address is assigned to every host. For each host on the network, the network part is the same, however, the host half must vary.

• **Subnet number:**

This is the nonobligatory part of IPv4. Local networks that have massive numbers of hosts are divided into subnets and subnet numbers are appointed to that.

➤ **Format of IPv4 Address: IPv4 Dotted Decimal Notation**

• The 32-bit IPv4 addresses are most often expressed in dotted decimal notation, in which each octet (or byte) is treated as a separate number. Within an octet, the rightmost bit represents 2^0 (or 1), increasing to the left until the first bit in the octet is 2^7 (or 128). Following are IP addresses in binary format and their dotted decimal equivalents:

11010000 01100010 11000000 10101010 = 208.98.192.170

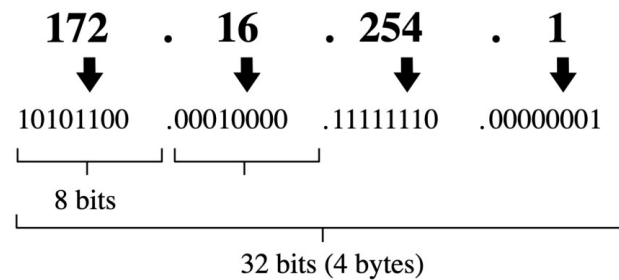
01110110 00001111 11110000 01010101 = 118.15.240.85

00110011 11001100 00111100 00111011 = 51.204.60.59

IPv4

- IP addresses specify the location of devices on the internet. IPv4 is a type of IP address. There are 32 bits in an IPv4 address, for a total of 2^{32} (about 4 billion) IPv4 addresses. IPv4 is the most common way to do addressing, but only having 4 billion addresses has led to the creation of IPv6 (which isn't important for the exam).
- IPv4 addresses are represented in "dot-decimal" notation. There are four numbers 0–255 separated by decimals.
- IP addresses can be broken up into two parts, the **network prefix** which specifies the location of the network, and the **host identifier** which specifies a device on the network
- An IPv4 address consists of four numbers, each of which contains one to three digits, with a single dot (.) separating each number or set of digits. Each of the four numbers can range from 0 to 255. This group of separated numbers creates the addresses that let you and everyone around the globe to send and retrieve data over our Internet connections. The IPv4 uses a 32-bit address scheme allowing to store 2^{32} addresses which is more than 4 billion addresses

IPv4 address in dotted-decimal notation



Use Source Network Address Translation (SNAT) for outbound connections

- Link : <https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-outbound-connections>

Create, change, or delete an Azure public IP address

- Link : <https://docs.microsoft.com/en-us/azure/virtual-network/ip-services/virtual-network-public-ip-address>

What is Azure Load Balancer?

- Link : <https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview>