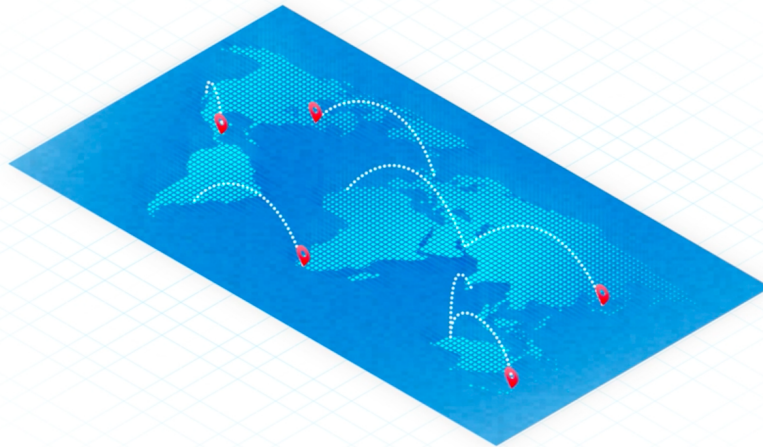
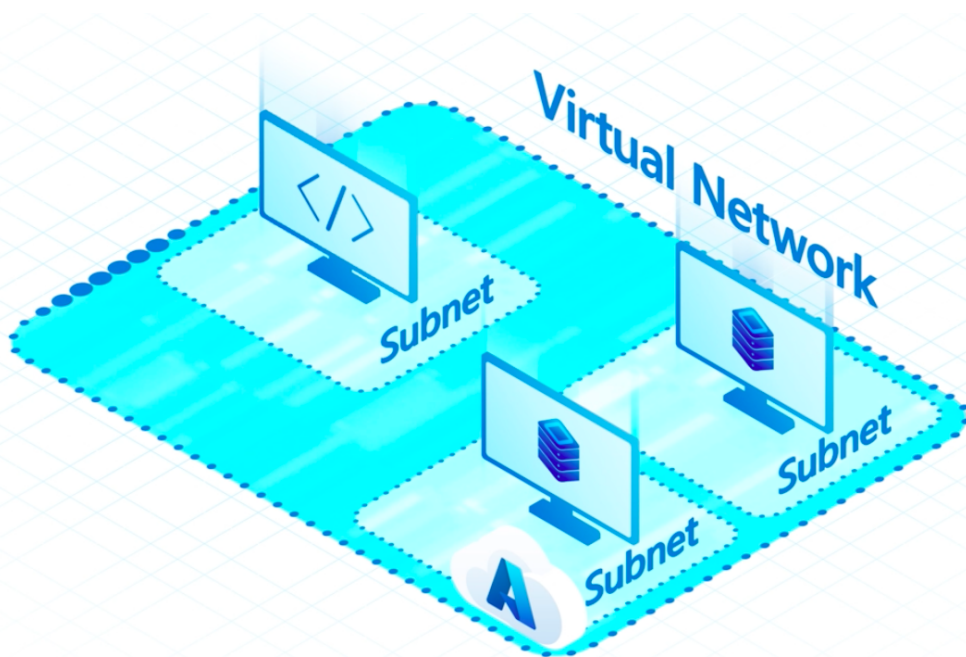
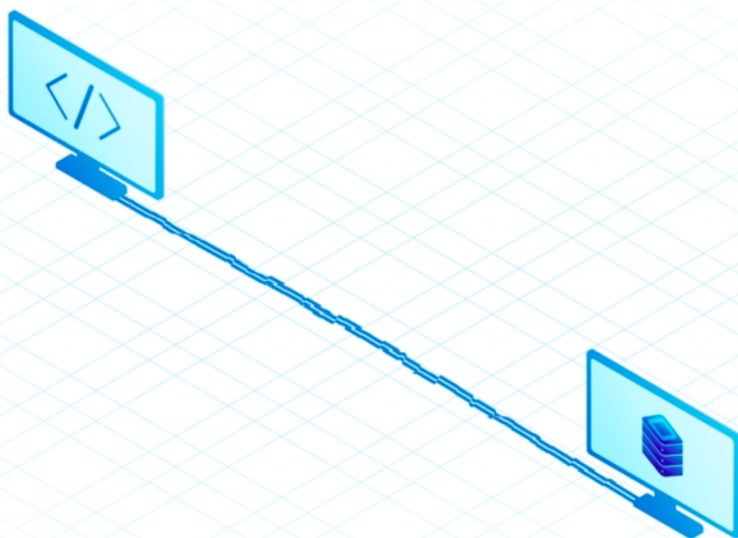
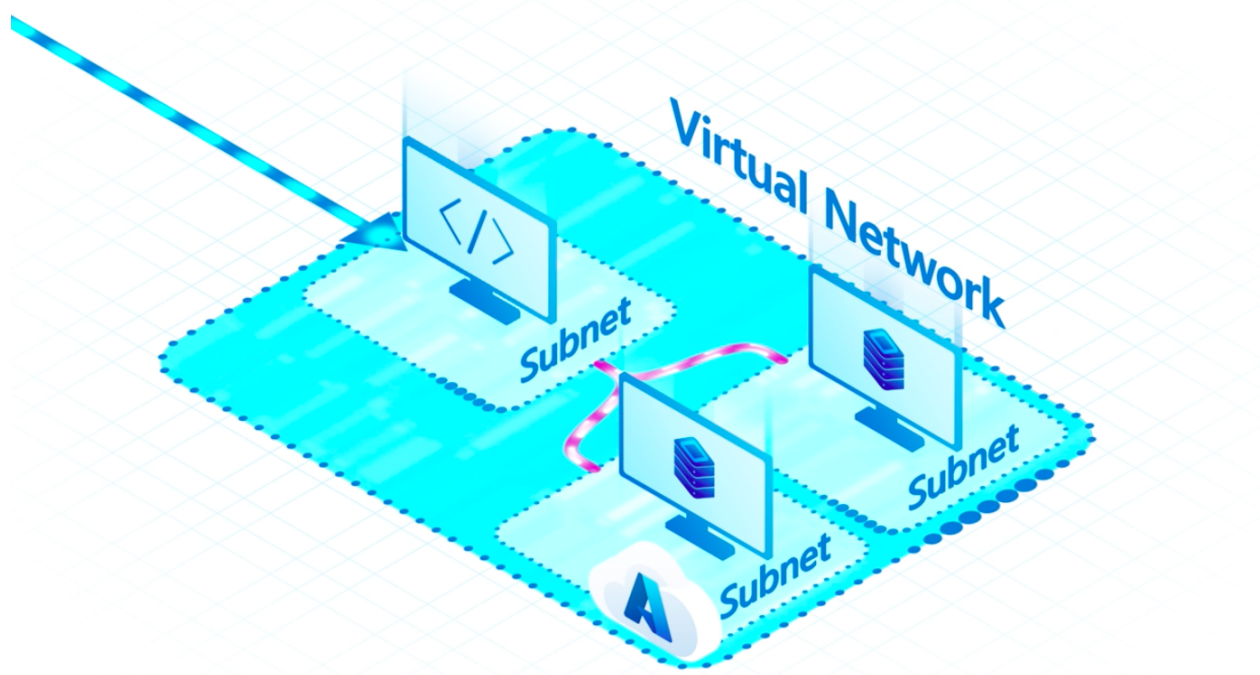


# Azure Virtual Network

Azure Virtual Network (VNet) is a critical service provided by Microsoft Azure, serving as the foundational building block for your private network in Azure. It allows Azure resources, such as virtual machines (VMs), to securely communicate with each other, the internet, and on-premises networks.







## Why Use an Azure Virtual Network?

Azure Virtual Network facilitates several key scenarios:

### Communication of Azure Resources with the Internet

**Outbound Communication:** All resources within a VNet can communicate outbound with the internet by default. Public IP addresses, NAT gateways, or public load balancers can manage these connections.

**Inbound Communication:** Resources can receive inbound connections via public IP addresses or public load balancers. Without specific configurations like instance-level public IP addresses or a public load balancer, outbound connectivity is restricted if only an internal standard load balancer is used.

### Communication Between Azure Resources

Azure resources can communicate securely through various methods:

**Virtual Network:** VMs and other Azure resources (e.g., App Service Environments, Azure Kubernetes Service, Azure Virtual Machine Scale Sets) can be deployed within a VNet. A comprehensive list of deployable resources can be found in Azure's documentation.

**Virtual Network Service Endpoints:** These extend a VNet's private address space to Azure service resources, securing resources like Azure Storage accounts and Azure SQL Databases to the VNet.

**Virtual Network Peering:** Connects VNets, allowing resources in different VNets, even across regions, to communicate.

### Communication with On-Premises Resources

Connecting on-premises networks and computers to a VNet can be achieved via:

**Point-to-Site VPN:** Establishes a secure connection between a VNet and individual computers, suitable for developers and initial Azure setups.

**Site-to-Site VPN:** Connects on-premises VPN devices with Azure VPN gateways, allowing authorized on-premises resources access to the VNet.

**Azure ExpressRoute:** Provides a private, internet-independent connection between on-premises networks and Azure through an ExpressRoute partner.

## Filtering Network Traffic

Network traffic can be filtered using:

**Network Security Groups (NSGs):** Contain inbound and outbound security rules for filtering traffic based on IP addresses, ports, and protocols.

**Network Virtual Appliances (NVAs):** VMs performing network functions like firewalls or WAN optimization. A variety of NVAs can be deployed from the Azure Marketplace.

## Routing Network Traffic

Azure routes traffic between subnets, VNets, on-premises networks, and the internet by default. Custom routing can be implemented through:

**Route Tables:** Control traffic routing for each subnet.

**Border Gateway Protocol (BGP) Routes:** Propagate on-premises BGP routes to VNets when connected via Azure VPN gateways or ExpressRoute.

## Integration with Azure Services

Integration options include:

**Dedicated Instances:** Deploying service instances within a VNet for private access.

**Azure Private Link:** Accessing specific service instances privately from VNets and on-premises networks.

**Service Endpoints:** Securing public service resources to VNets by extending the VNet to the service.

## Limits

Azure imposes limits on the number of resources that can be deployed within a VNet. Most networking limits are set at maximum values but can be increased if necessary. Detailed information on these limits is available in Azure's networking limits documentation.

## Virtual Networks and Availability Zones

VNets and subnets span all availability zones within a region. This design ensures that zonal resources, like zonal VMs, do not require adjustments based on the VNet when selecting availability zones.

## Pricing

Azure Virtual Network usage is free. However, standard charges apply for resources like VMs and other Azure products. Detailed pricing information can be found on the [Azure pricing calculator](#).

## Next Steps

To delve deeper into Azure Virtual Network:

Learn more about VNet concepts and best practices.

Create a virtual network, deploy VMs, and establish communication between them.

Follow training modules on designing and implementing core Azure networking infrastructure, including virtual networks.