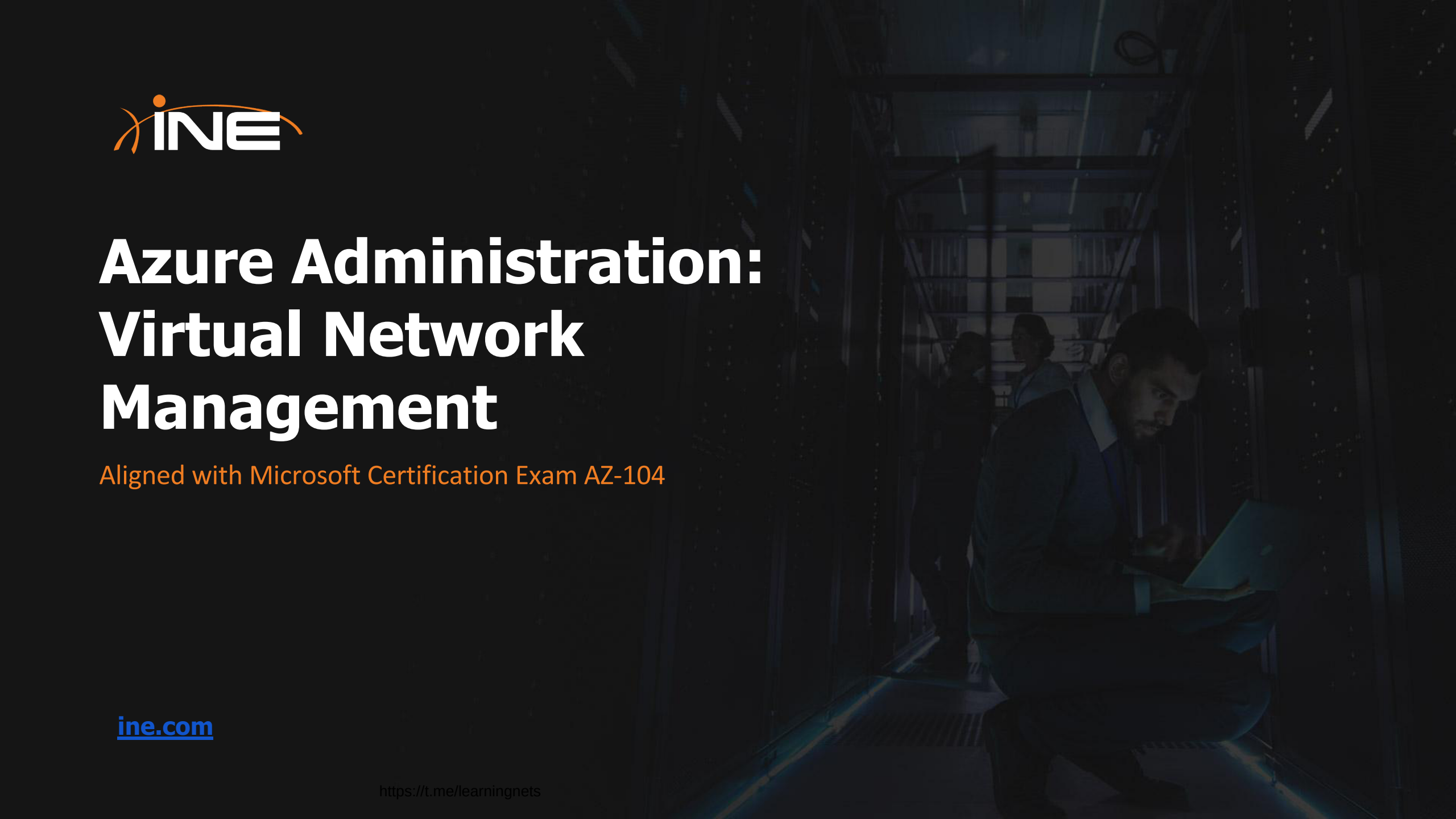


Azure Administration: Virtual Network Management

Aligned with Microsoft Certification Exam AZ-104

ine.com

Course Topics

Provision Networks
Manage Networks
Monitor Networks
Azure DNS
Azure Load Balancing
Network Connectivity
Network Access

AZ-104 Objective Domains

- Manage Azure Identities and Governance (15-20%)
- Implement and Manage Storage (10-15%)
- Deploy and Manage Azure Compute Resources (25-30%)
- **Configure and Manage Virtual Networking (30-35%)**
- Monitor and back up Azure resources (10-15%)

Exam AZ-104: Microsoft Certified Azure Administrator Associate

- Implement and manage virtual networking
  - create and configure VNET peering
  - configure private and public IP addresses, network routes, network interface, subnets, and virtual network
- Configure name resolution
  - configure Azure DNS
  - configure custom DNS settings
  - configure a private or public DNS zone
- Secure access to virtual networks
  - create security rules
  - associate an NSG to a subnet or network interface
  - evaluate effective security rules
  - deploy and configure Azure Firewall
  - deploy and configure Azure Bastion Service

Exam AZ-104: Microsoft Certified Azure Administrator Associate

- Configure load balancing
  - + configure Application Gateway
  - + configure an internal load balancer
  - + configure load balancing rules
  - + configure a public load balancer
  - + troubleshoot load balancing
- Monitor and troubleshoot virtual networking
  - + monitor on-premises connectivity
  - + use Network Performance Monitor
  - + use Network Watcher
  - + troubleshoot external networking
  - + troubleshoot virtual network connectivity
- Integrate an on-premises network with an Azure virtual network
  - + create and configure Azure VPN Gateway
  - + create and configure VPNs
  - + configure ExpressRoute
  - + configure Azure Virtual WAN

Pre-requisites

- **Azure Fundamentals**

Provision Virtual Networks

Provision Virtual Networks

- Virtual Network Components
- Provision Virtual Networks
- Configure Subnets
- Demo: Provision Virtual Networks

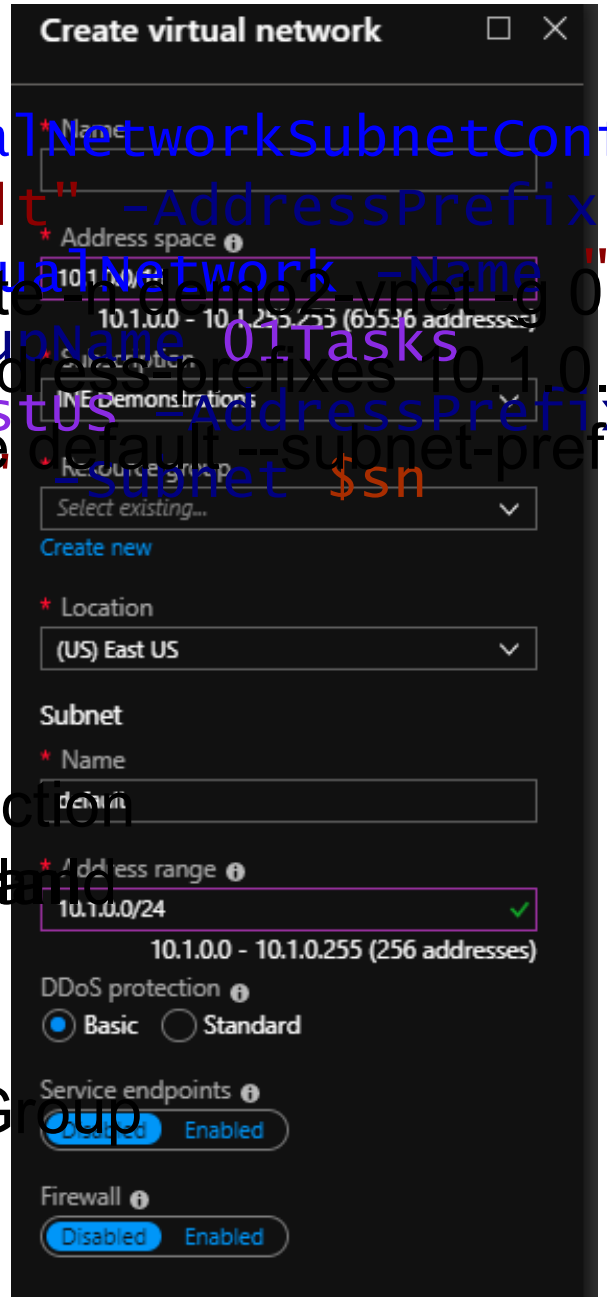
Virtual Network Components

Provision Virtual Networks

+ Portal
+ PowerShell
+ CLI

```
$sn = New-AzVirtualNetworkSubnetConfig `
      -Name "default" -AddressPrefix "10.0.0.0/24"
$vnet = New-AzVirtualNetwork -Name "demo-vnet" `
      -ResourceGroupName 01Tasks `
      -Location EastUS -AddressPrefix `
      "10.0.0.0/16" -Subnet $sn
```

```
az network vnet create -n demo2-vnet -g 01Tasks \
 -l EastUS --address-prefixes 10.1.0.0/16 \
 --subnet-name default --subnet-prefixes
10.1.0.0/24
```



Network options

- EnableDdosProtection
- DdosProtectionPlanId
- DnsServers

Subnet options

- NetworkSecurityGroup
- RouteTable
- ServiceEndpoint

Configure Subnets

- Network security groups
- Route tables
- Service endpoints
- Multiple subnets

Demo: Provision Virtual Networks

Public and Private IP Addressing

Public and Private IP Addressing

- IP Addressing in Azure
- Azure Public IP Addresses
- Azure Private IP Addresses
- Demo: Azure IP Addressing

IP Addressing In Azure

Azure Public IP Addresses

- Stand-alone resource
- Assigned to
  - virtual machine
  - load balancer
  - VPN gateway
  - application gateway
- Tier
  - Basic – static or dynamic
  - Standard – static, zone aware/zone redundant, public IP prefix

Azure Private IP Addresses

- Defined by subnet IP address range
  - specified in CIDR notation – network id/mask bits (10.0.0.0/24)
  - unavailable – network ID + broadcast + first three
  - 10.0.0.0/24 – 10.0.0.4 through 10.0.0.254 (251 available)
  - smallest /29 (3 available)
- Dynamic or static
- NAT based
  - 10/8
  - 172.16/12
  - 192.168/16
  - Public*

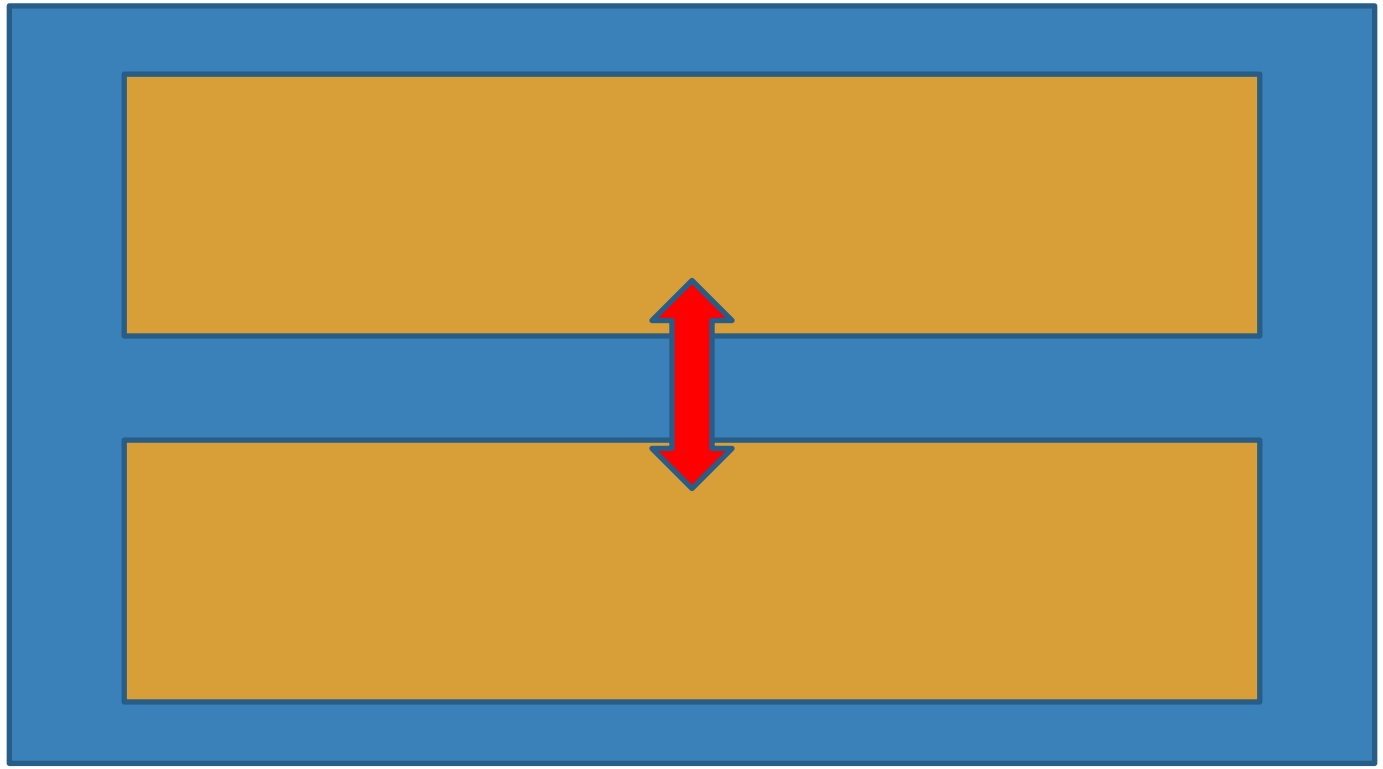
Demo: Azure IP Addressing

Azure Network Routing

Azure Network Routing

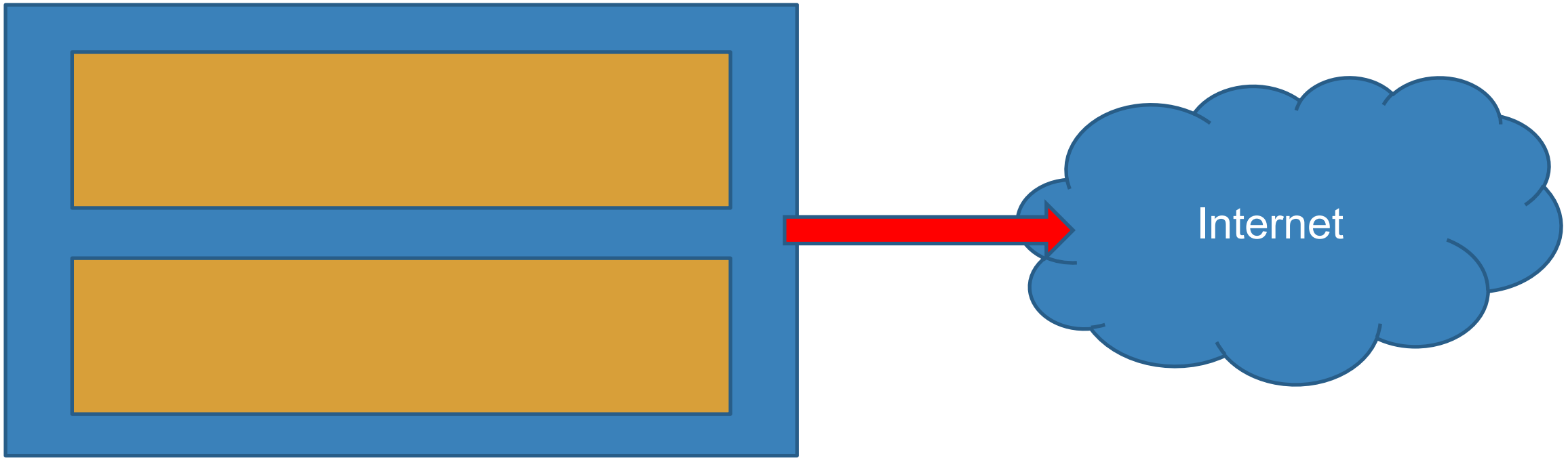
- Azure System Routes
- Azure Route Tables
- Demo: Azure Routing

Azure System Routes



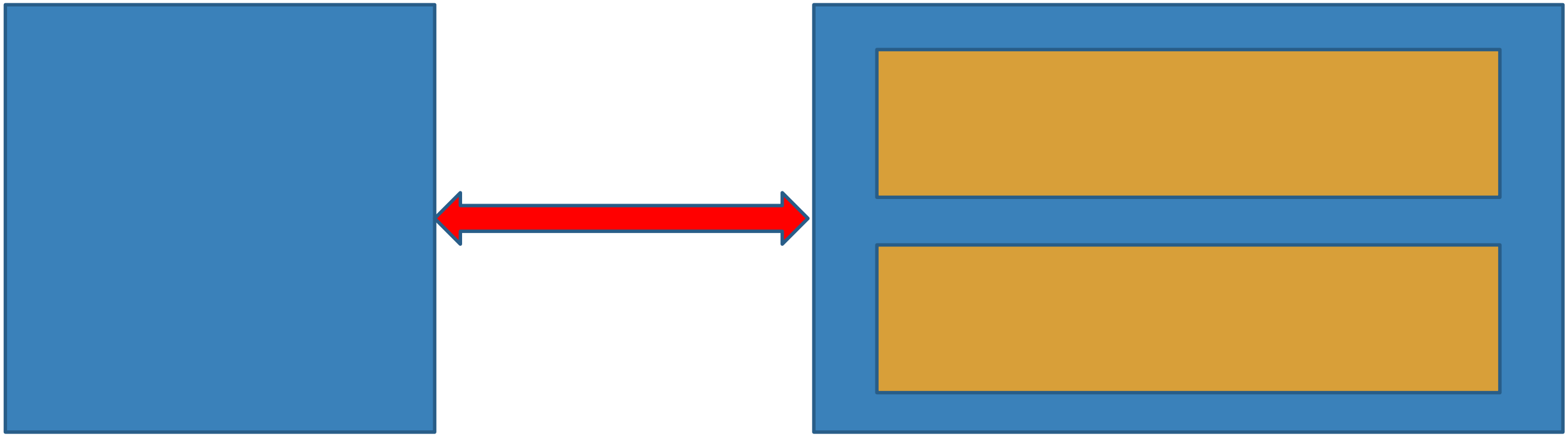
Virtual network

Azure System Routes



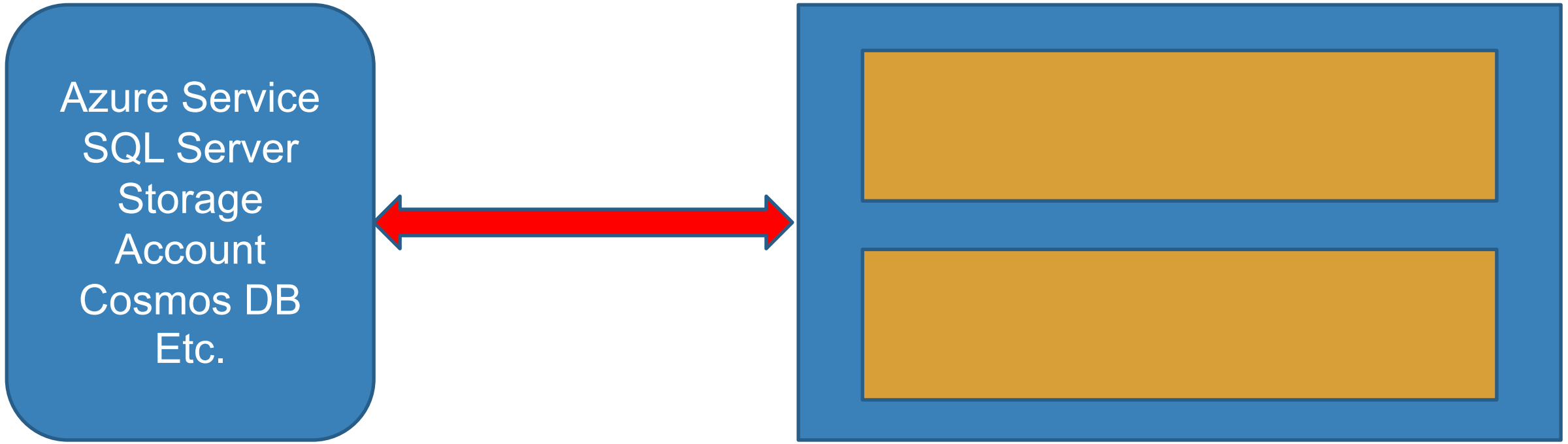
Internet

Azure System Routes



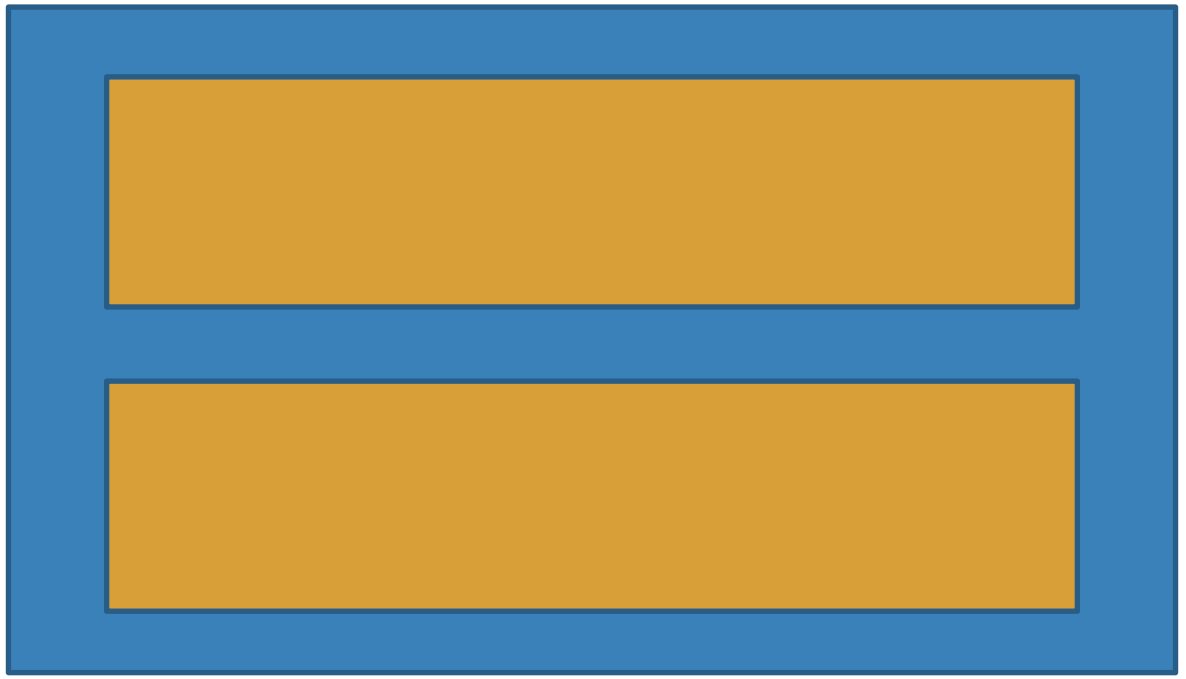
Peering / Virtual Network Gateway

Azure System Routes



Service Endpoint

Azure System Routes



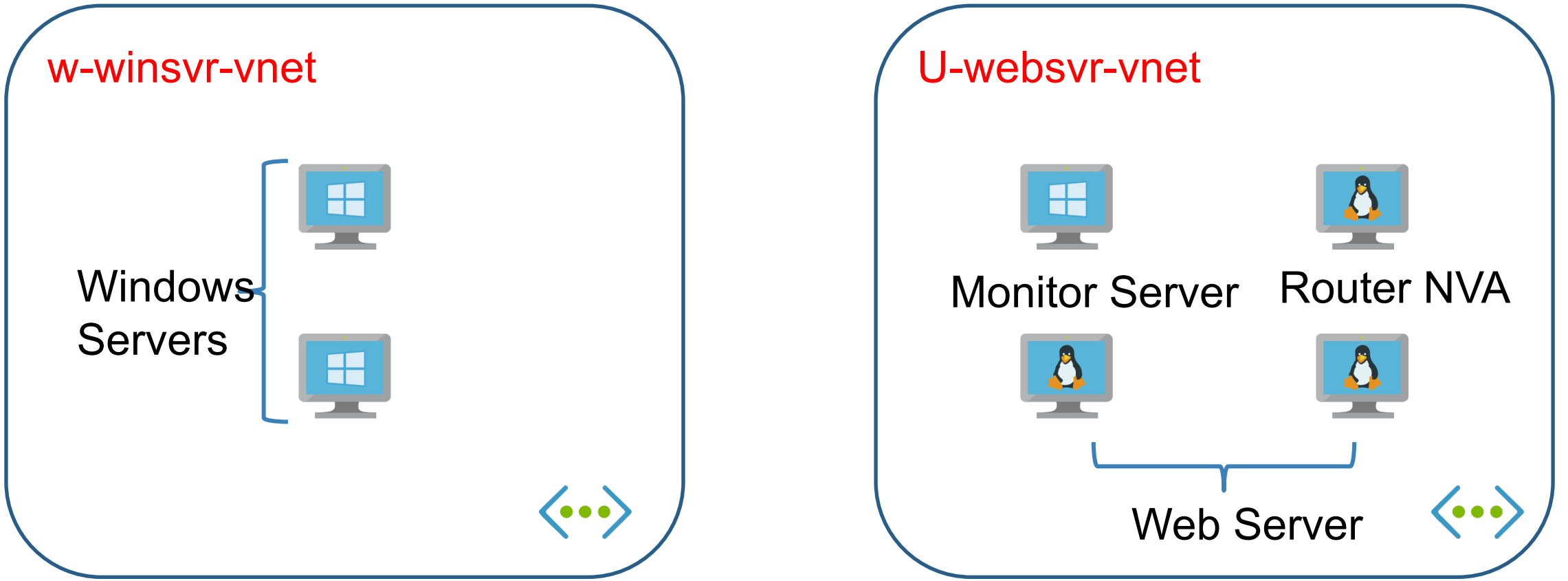
None

Route Tables

- Applied to subnets
- Route rules
  - prefix
  - next-hop
    - virtual appliance (requires next hop IP address)
    - virtual network gateway (VPN type only. ExpressRoute via BGP)
    - virtual network
    - internet
    - none
- Route selection
  - longest prefix (10.0.0.0/24 -> 10.0.0.0/16)
  - user -> BGP -> System

Demo: Azure Routing

Demonstration Architecture



Deploy Network Security Groups

Deploy Network Security Groups

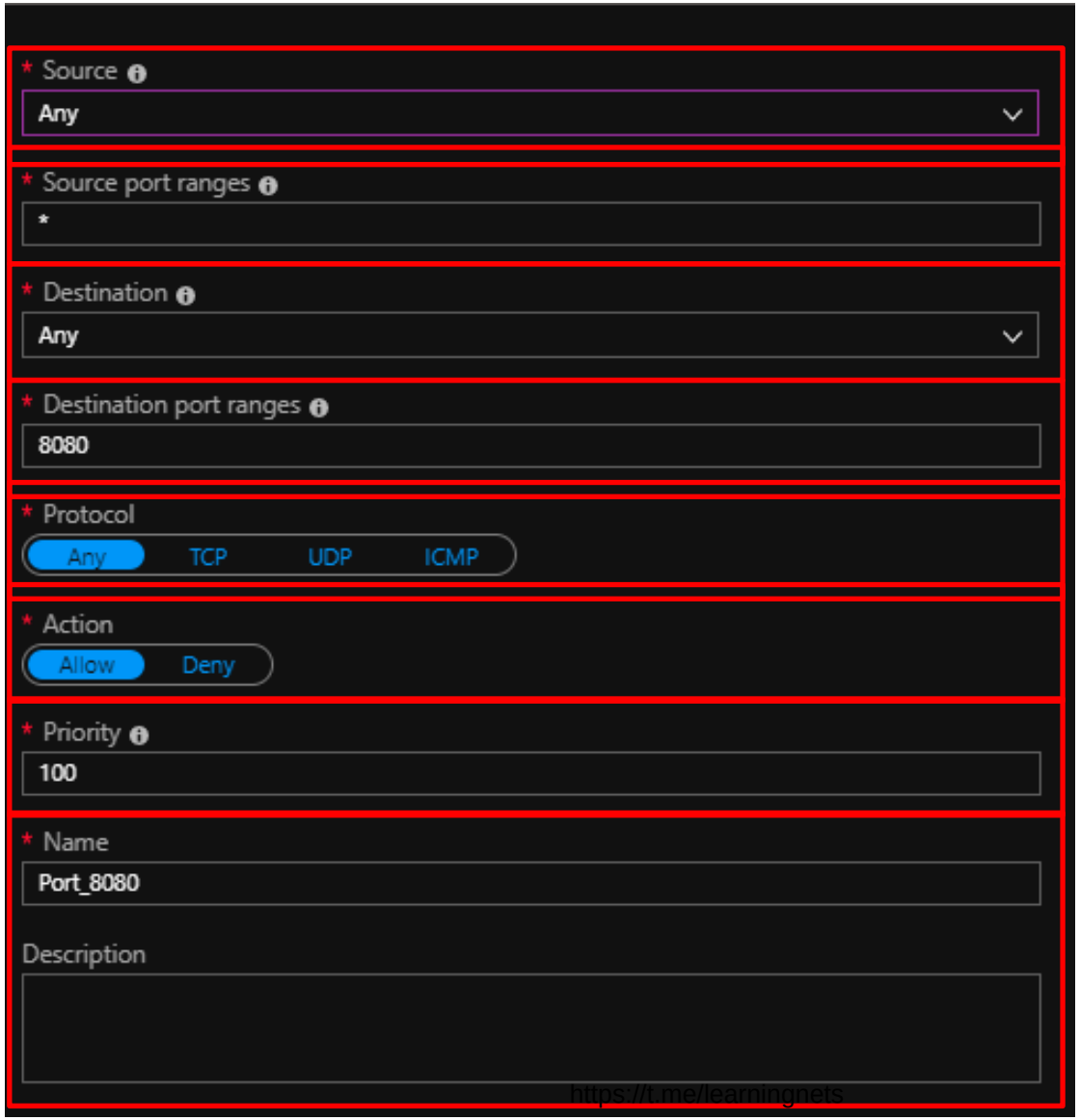
- Network Security Group Overview
- Common Ports
- NSG Rules
- Service Tags
- Application Security Groups
- Demo: Apply Azure NSGs

Network Security Group Overview

Common Ports

Service	Standard Port
RDP	3389
SSH	22
WinRM	5985 (HTTP) / 5986 (HTTPS)
HTTP	80
HTTPS	443
DNS	53
LDAP	389
SMB	445

NSG Rules



IP addresses
Service tag

Port (80)
Port range (50-60)
Port ranges (80, 443, 100-110)

Unique
Low number to high number
100 to 4096

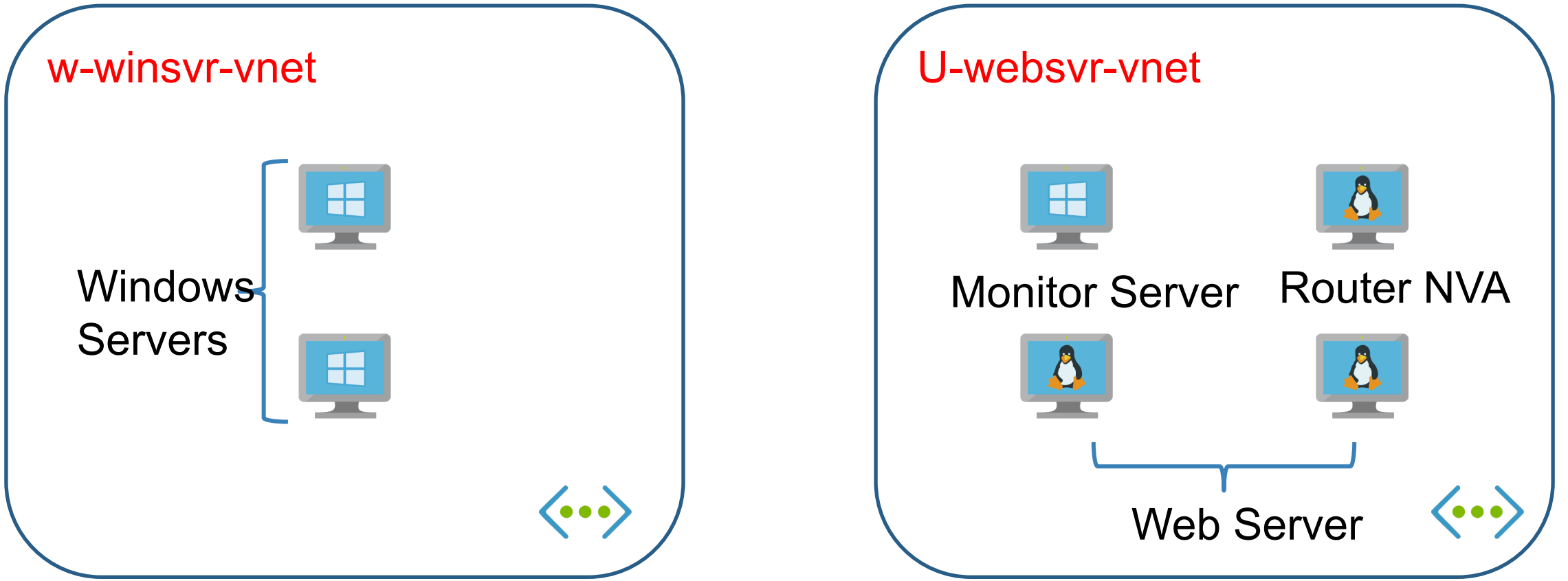
Service Tags

- Simplify Azure related addressing
- Internet
- Network
- Azure Services
  - storage
  - SQL
  - load balancer
  - many more

Application Security Groups

Demo: Apply Azure NSGs

Demonstration Architecture



Monitor Azure Virtual Networks

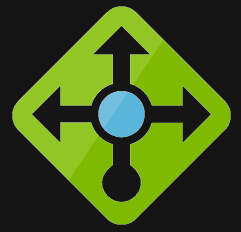
Monitor Azure Virtual Networks

- Monitor Network Components
- Network Watcher
- Troubleshoot Networking
- Network Performance Monitor
- Demo: Network Monitoring

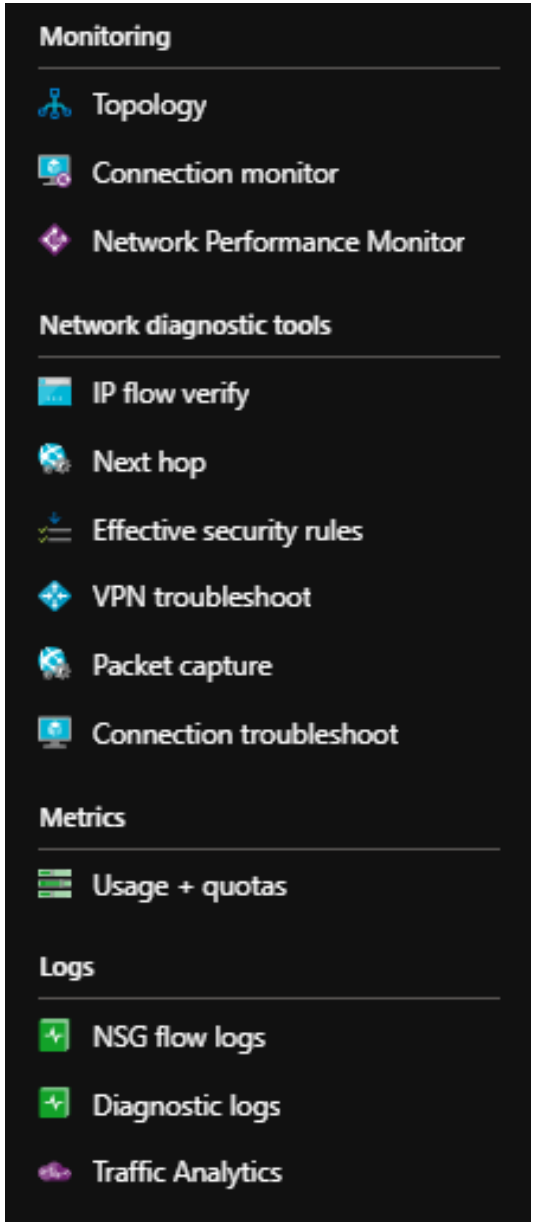
Monitor Virtual Networks

Virtual network

- Network components
- Network watcher
- Troubleshooting



Load balancer



52.186.64.255

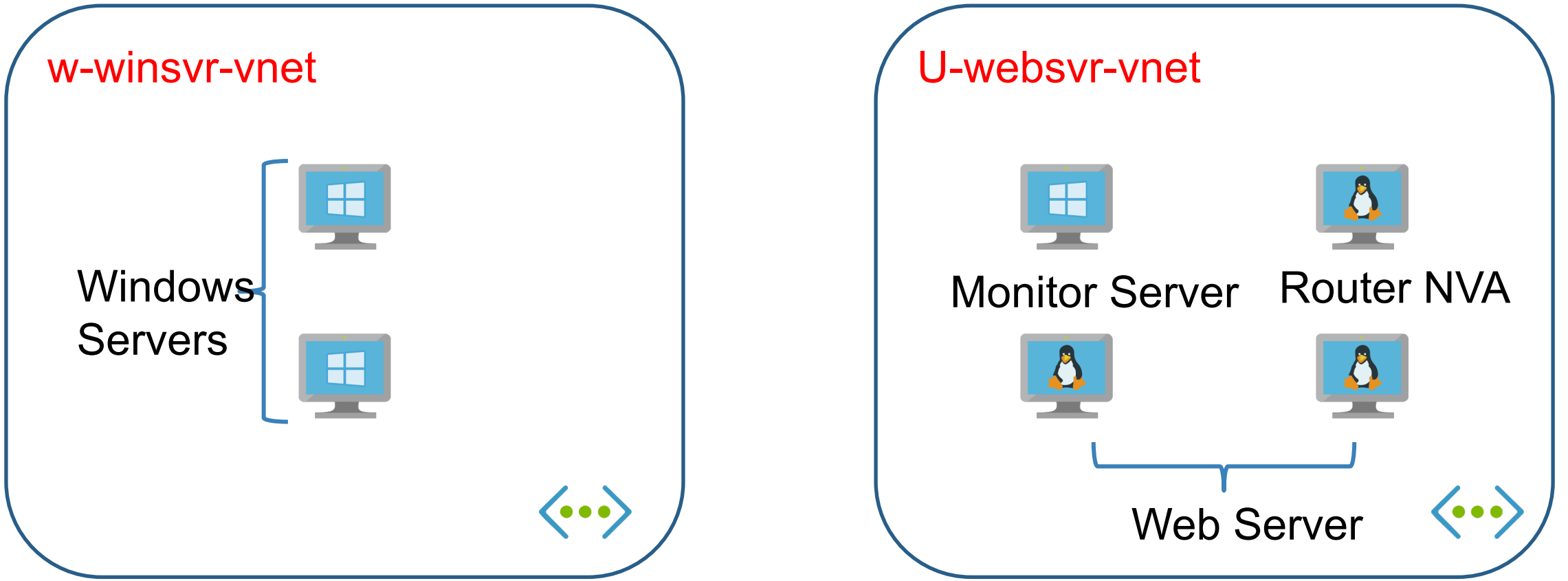
Public IP addres

Application gatewa

Network Performance Monitor

➢ Demo: Network Monitoring

Demonstration Architecture



Configure Public Azure DNS

Configure Public Azure DNS

- Azure DNS Zones
- Azure DNS Recordsets
- Using an Azure DNS Zone
- Demo: Public Azure DNS

Azure DNS Zones

Azure DNS Recordsets

- Multiple records
- Forward recordset types
  - A, AAAA
  - CAA
  - CNAME
  - MX
  - NS
  - SOA
  - SVR
  - TXT (SPF are represented as TXT)
- Reverse-lookup pointers (PTR records)

Using an Azure DNS Zone

- Provision DNS zone
- Register DNS zone with domain name registrar
- Add recordsets
- Delegate sub-domains

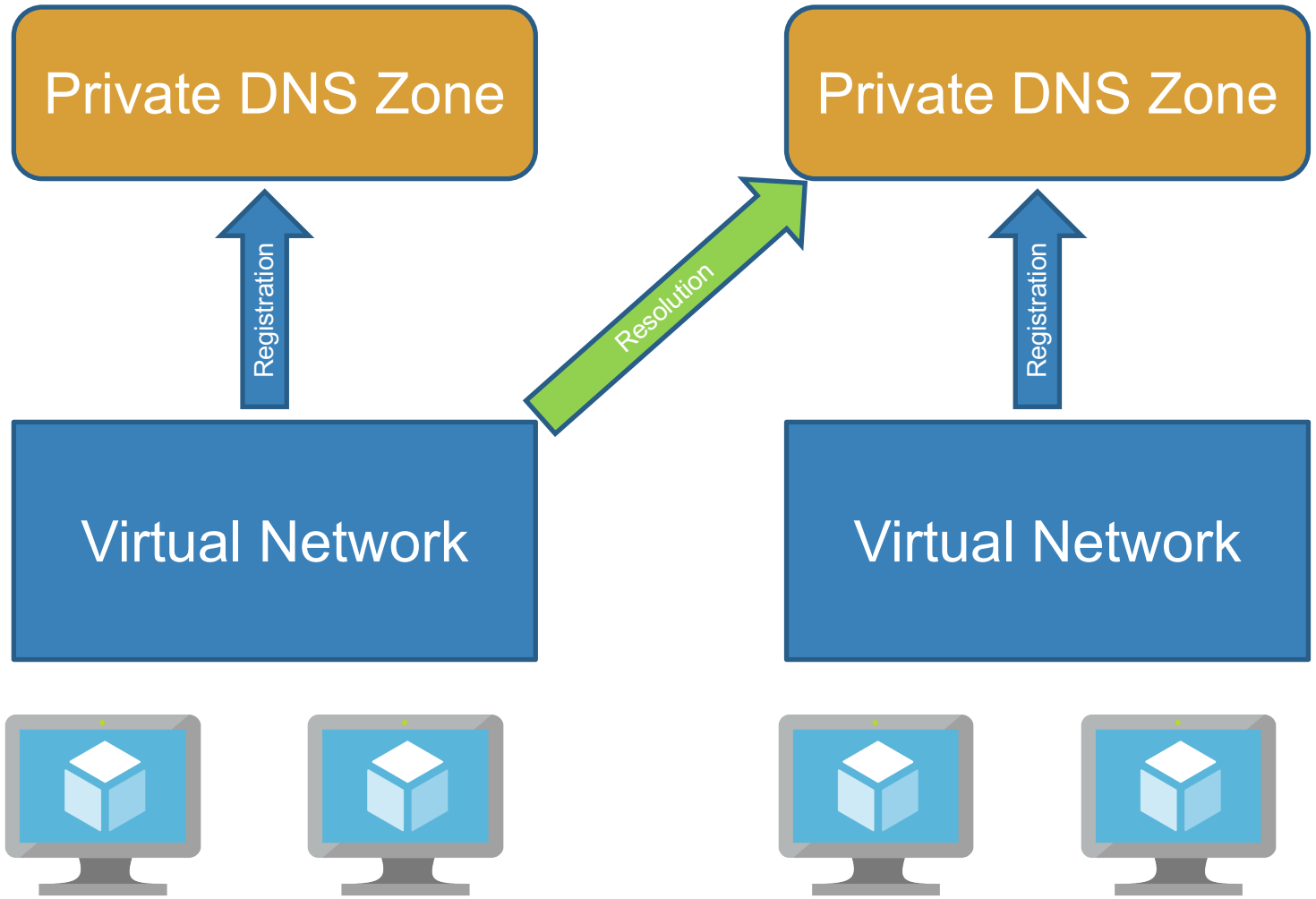
Demo: Public Azure DNS

Configure Private Azure DNS

Configure Private Azure DNS

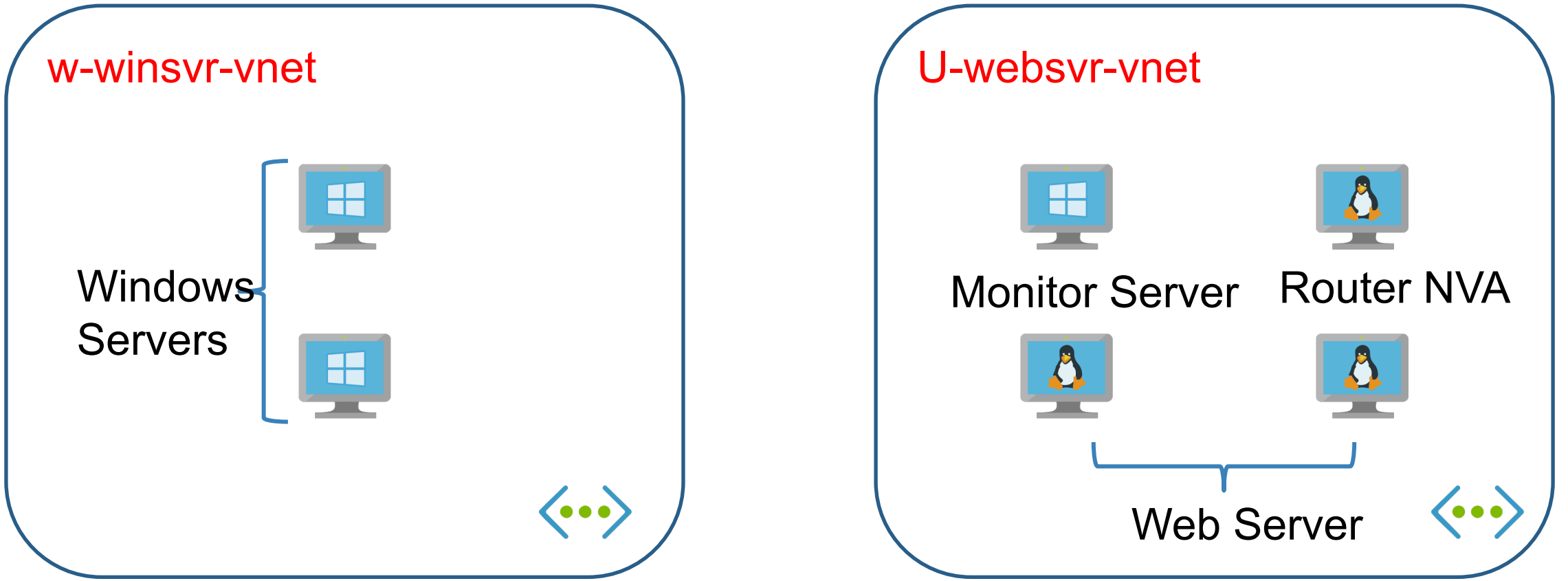
- Azure Private DNS Zones
- Demo: Implement Private DNS Zones

Azure Private DNS Zones



Demo: Implement Private DNS Zones

Demonstration Architecture



Configure Load Balancing

Configure Load Balancing

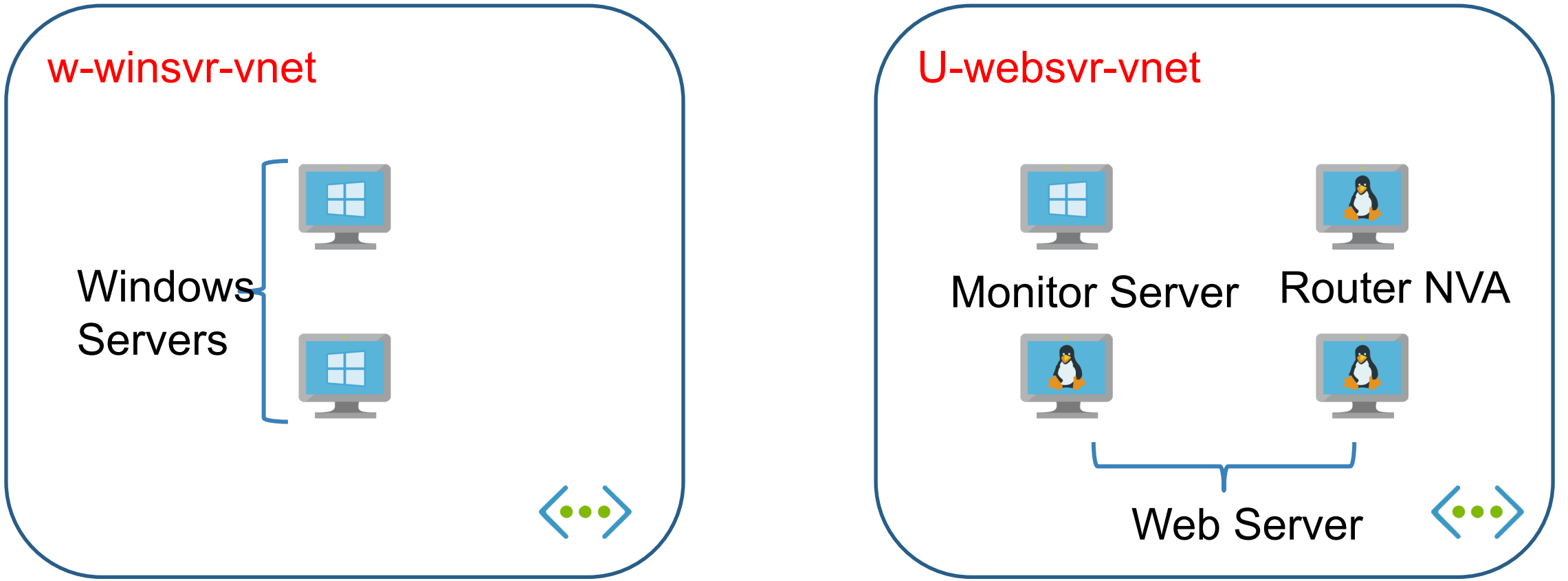
- Azure Load Balancer
- Load Balancer Elements
- Demo: Azure Load Balancer

Azure Load Balancer

Load Balancer Elements

Demo: Azure Load Balancer

Demonstration Architecture

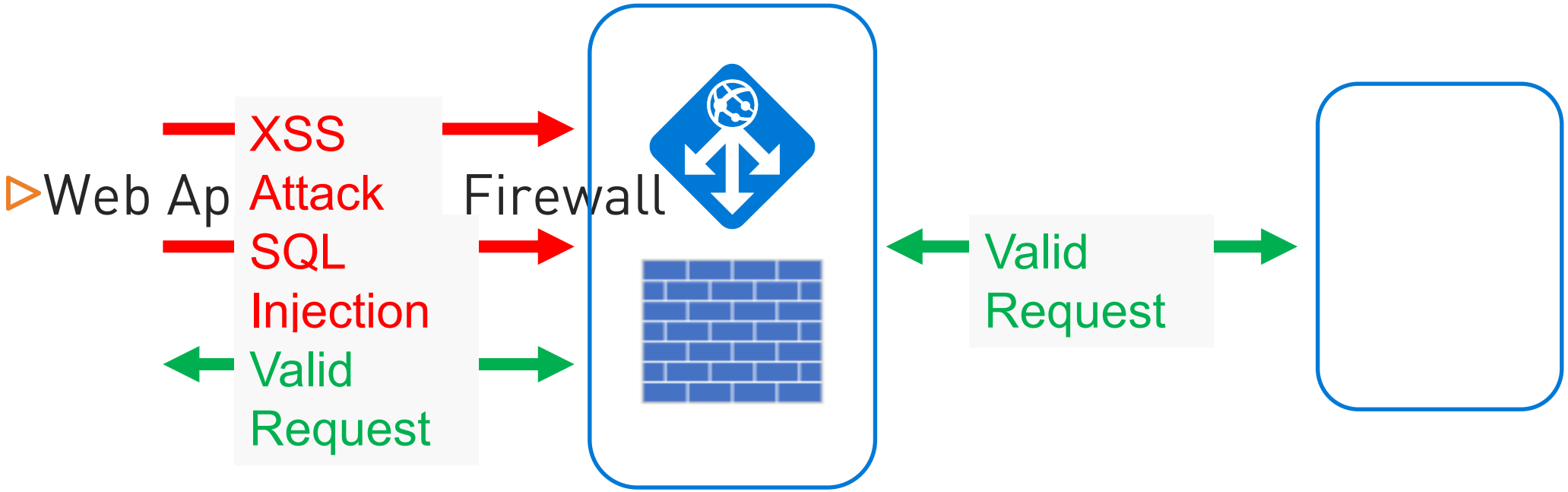


Configure Application Gateway

Configure Application Gateway

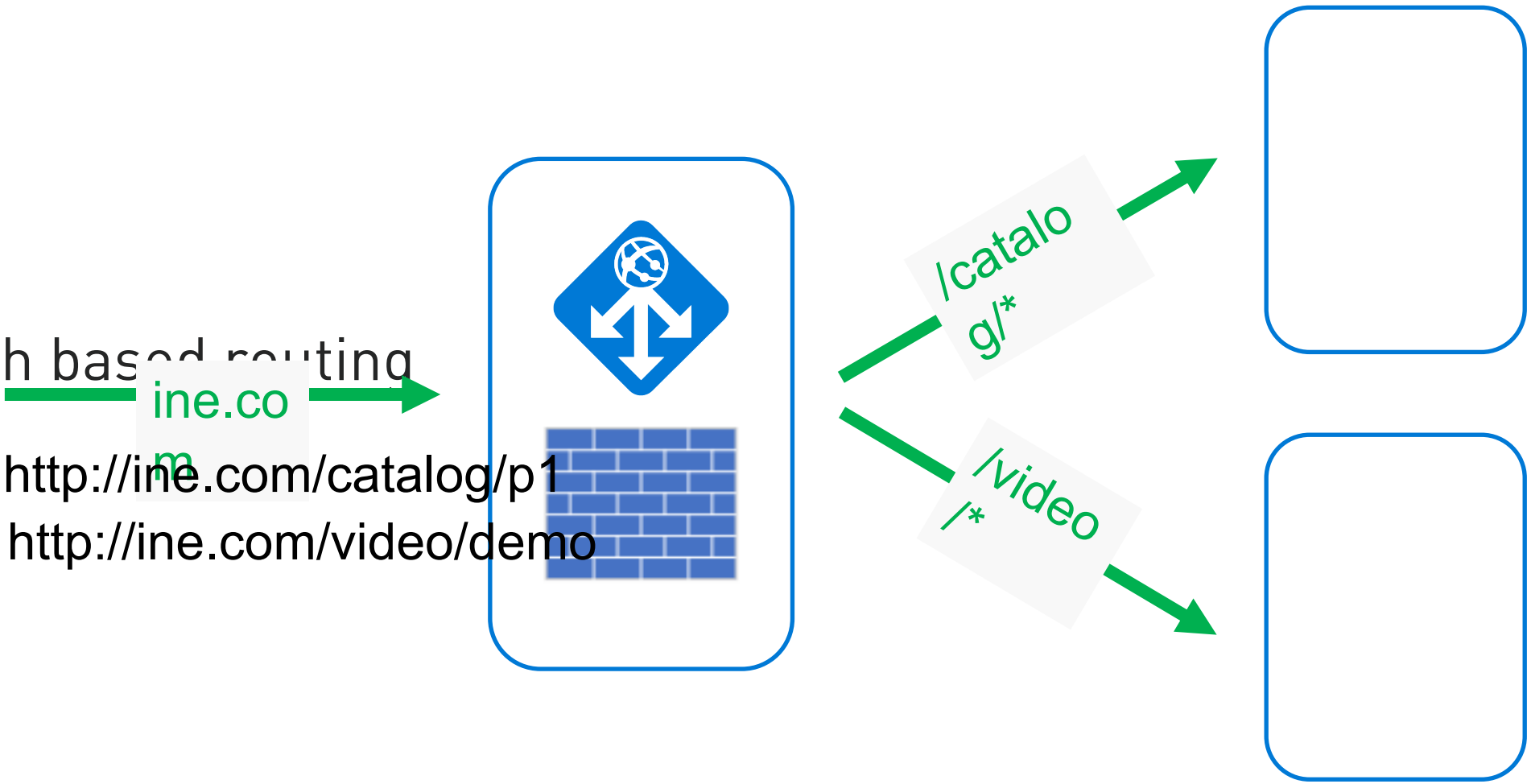
- Application Gateway Features
- Application Gateway Components
- Demo: Application Gateway

Application Gateway Features



Application Gateway Features

- Path based routing

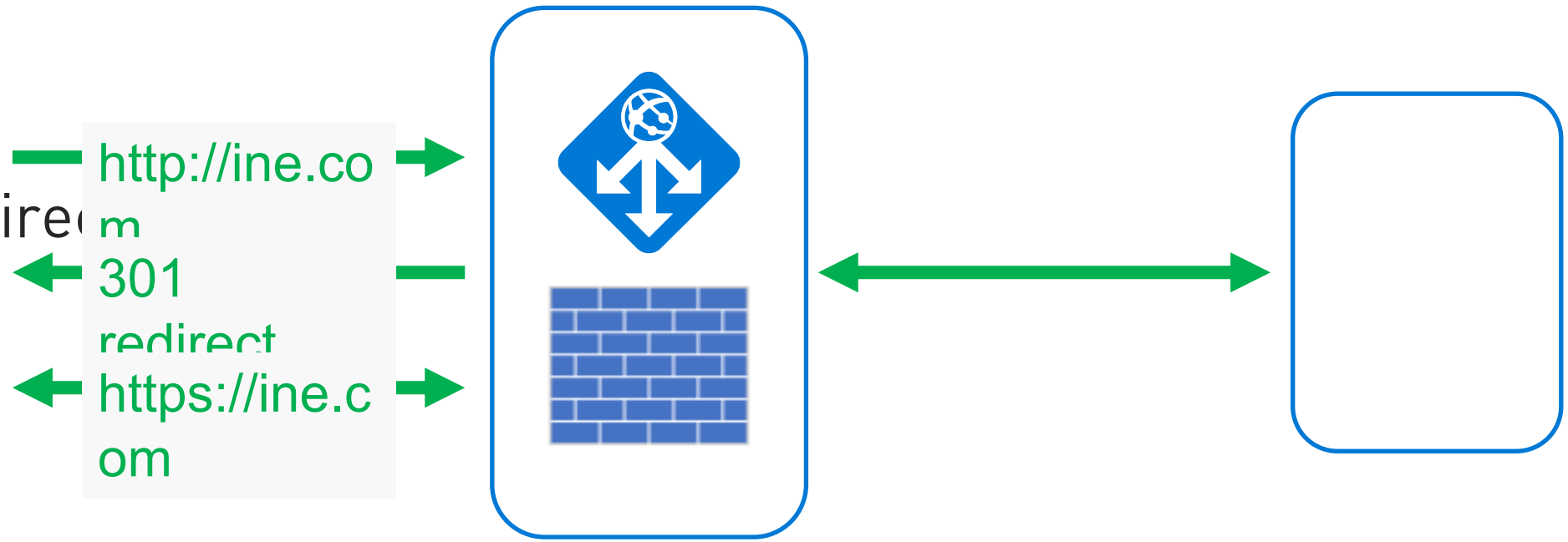


http://ine.com/catalog/p1

http://ine.com/video/demo

Application Gateway Features

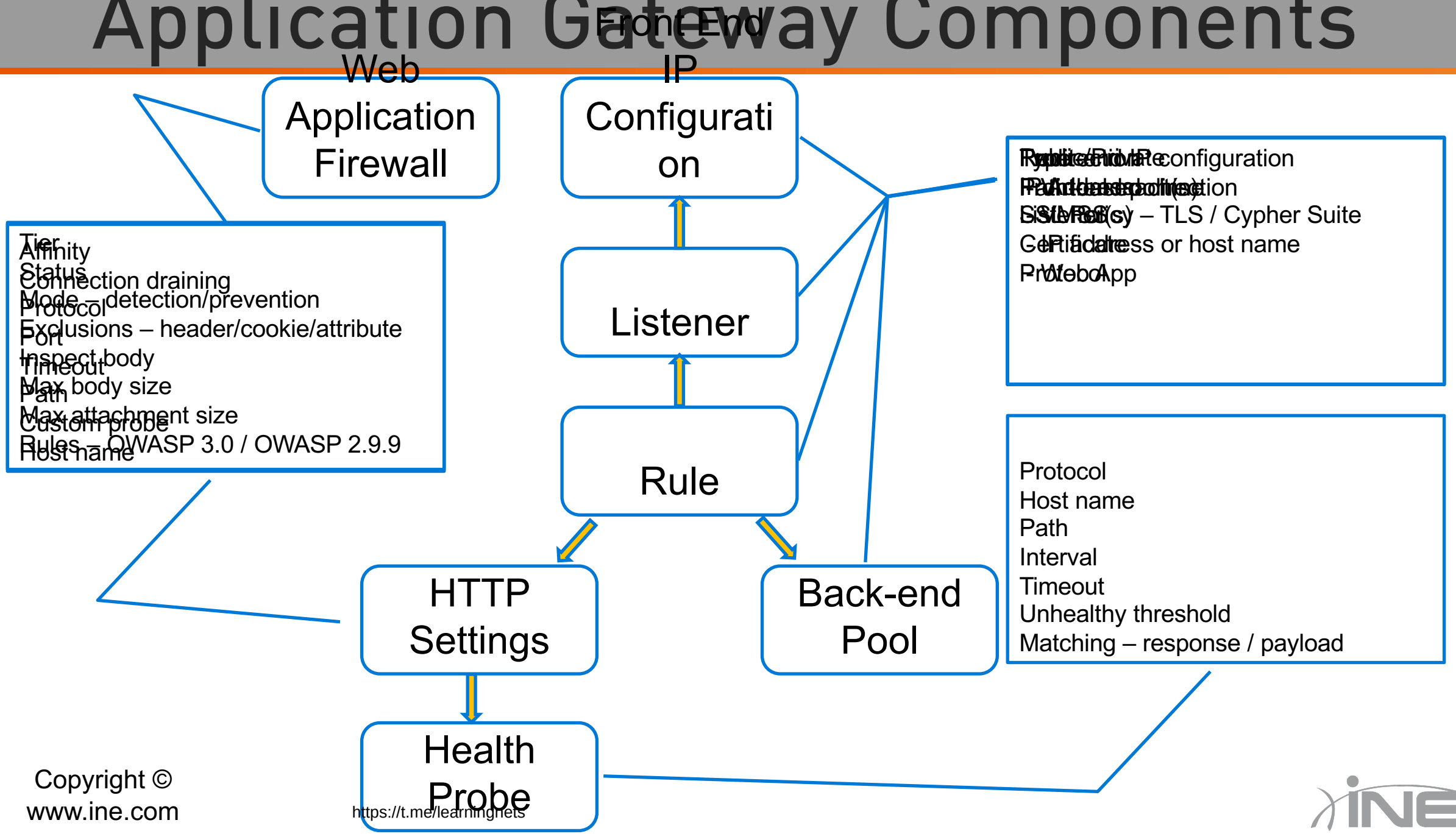
- Redirec



Application Gateway Features

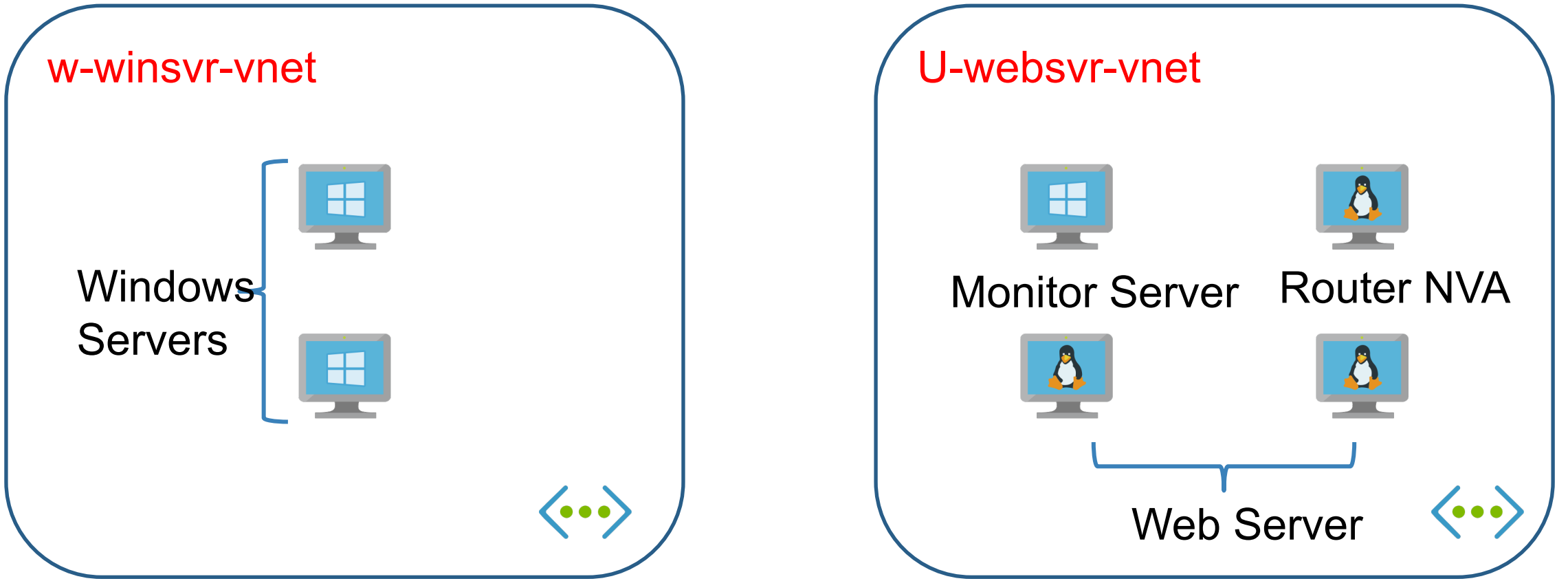
- Other Features
  - Session affinity
  - Websocket and HTTP/2 traffic
  - AKS ingress controller
  - Connection draining
  - Custom error pages
  - Re-write HTTP headers

Application Gateway Components



Demo: Application Gateway

Demonstration Architecture



Azure Network Connectivity

Azure Network Connectivity

- Azure Network Connectivity
- Azure Network Topologies

Azure Network Connectivity

Azure Network Topologies

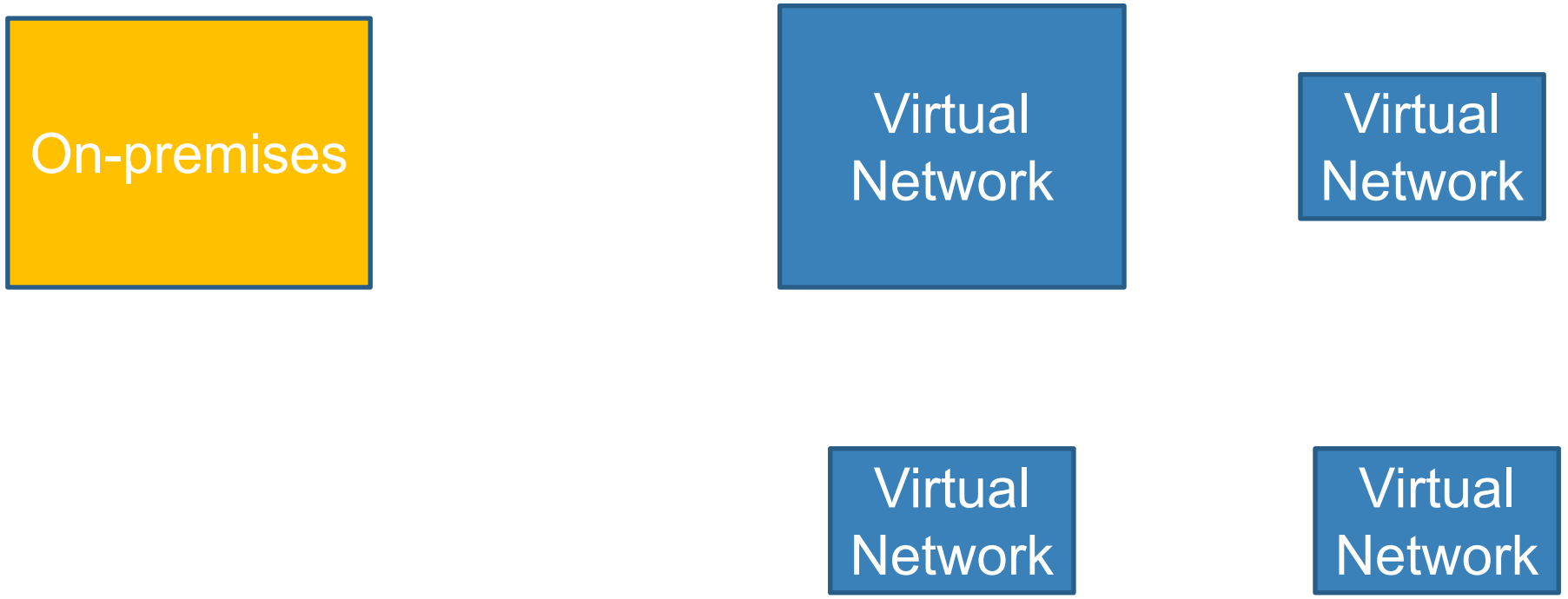
Basic Hybrid

Azure Network Topologies

Peering
-or-
Vnet 2 Vnet

Azure Network Topologies

Hub and Spoke

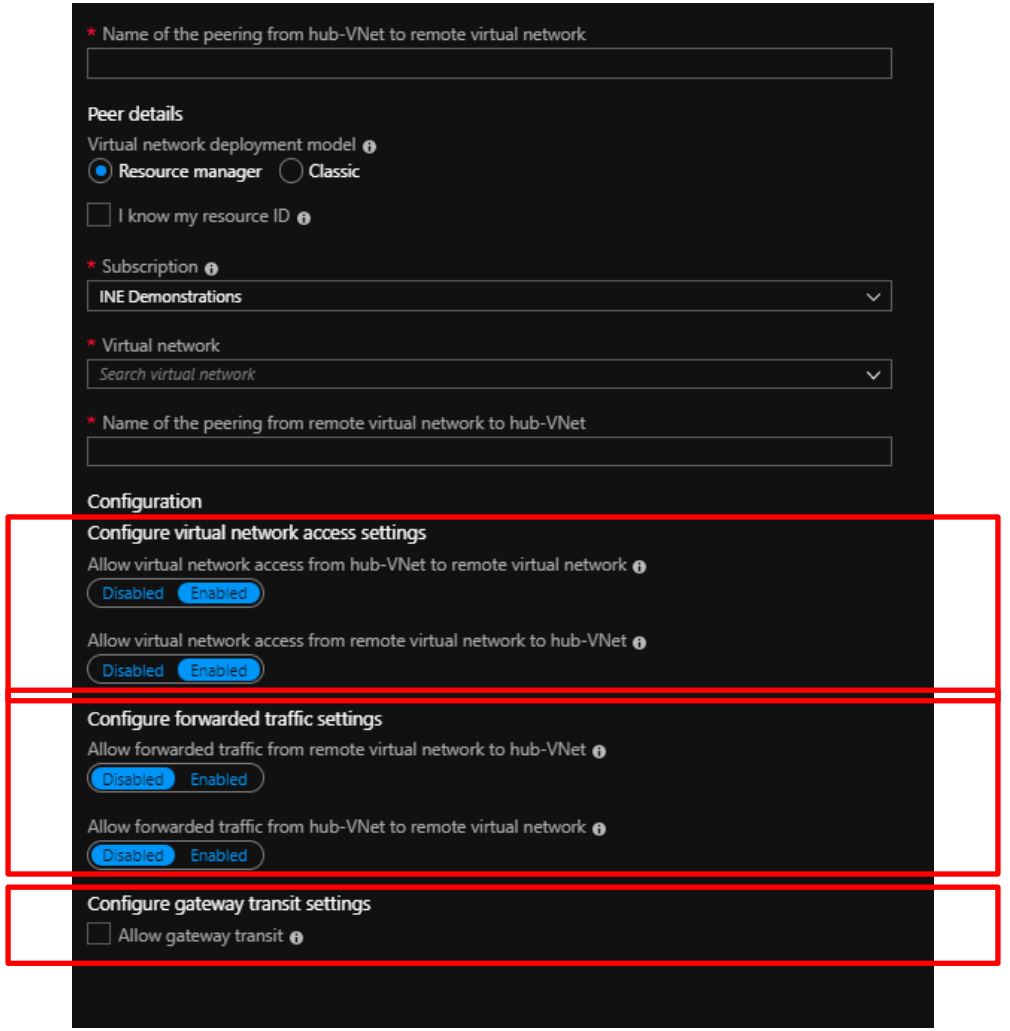


Configure Virtual Network Peering

Configure Virtual Network Peering

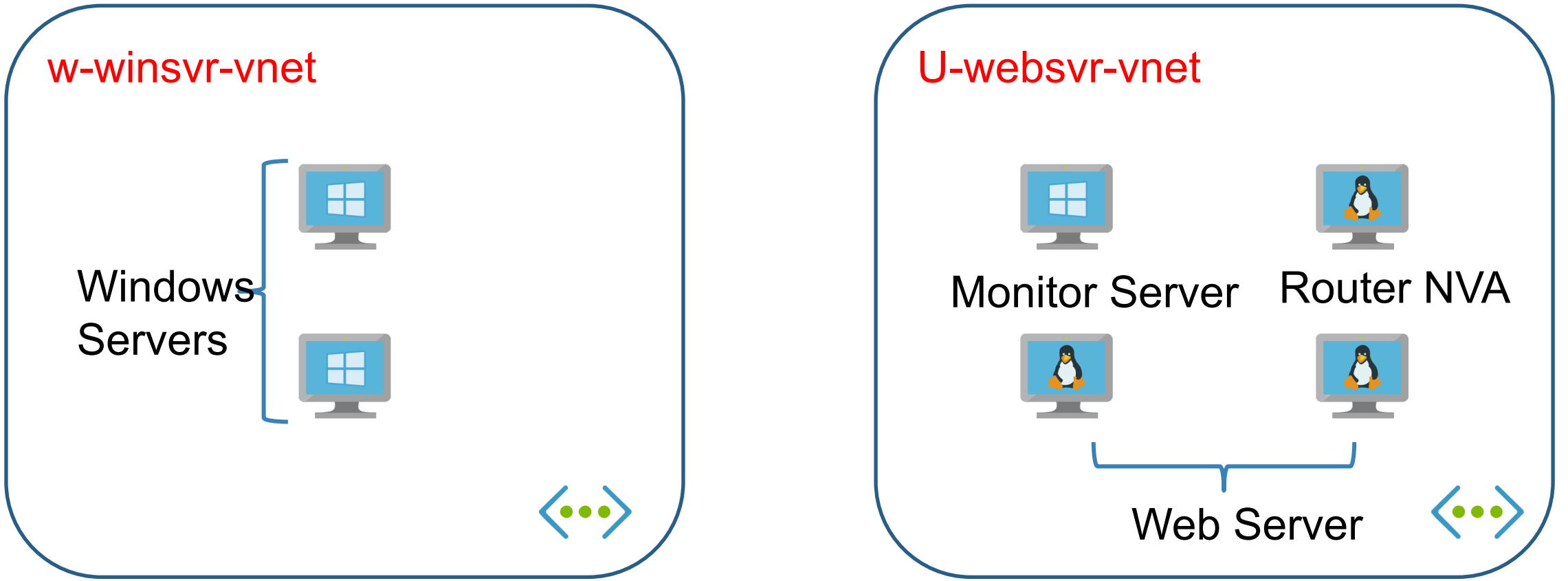
- Virtual Network Peering
- Demo: Virtual Network Peering

Virtual Network Peering



Demo: Virtual Network Peering

Demonstration Architecture



Use Virtual Network Gateways

Use Virtual Network Gateways

- Virtual Network Gateways
- Gateway Details
- Demo: VPN Gateway

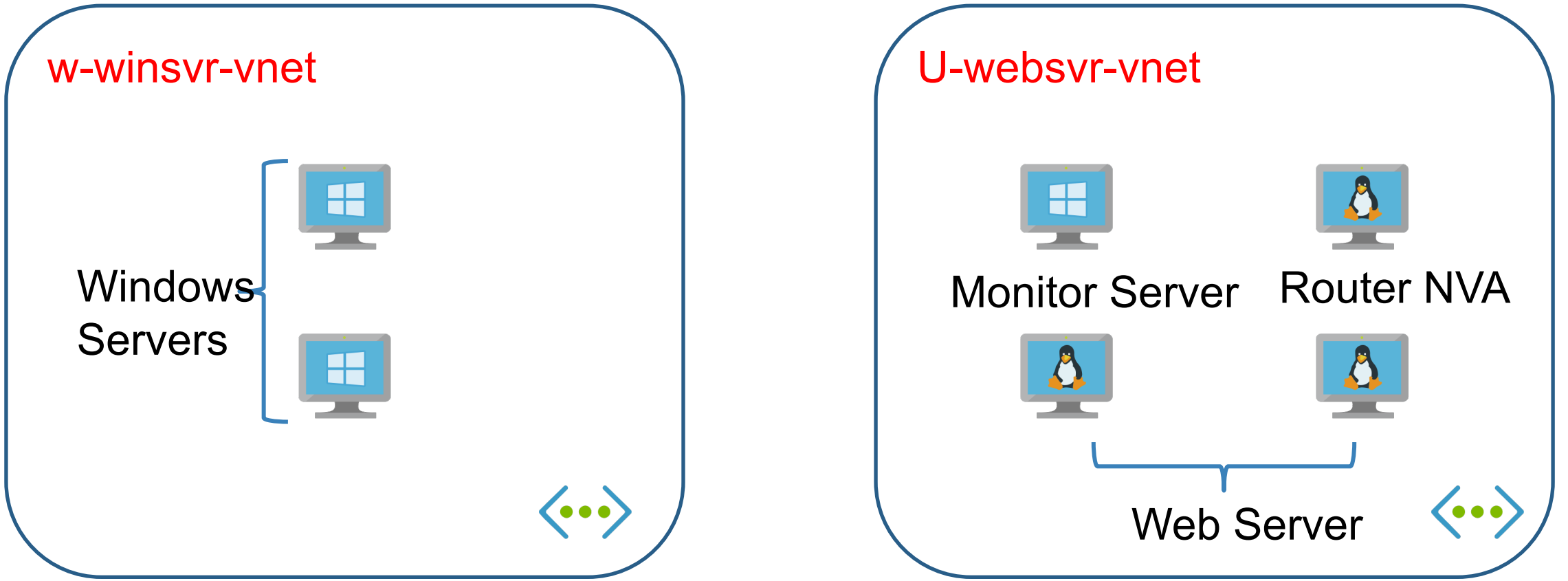
Virtual Network Gateways

Gateway Details

- VPN Gateway
  - Route-based – usually the choice
  - Policy-based
- Encryption
  - IKE/IPsec shared key
  - Custom Policy
- Point-to-site
  - Protocols – OpenVPN, SSTP (Microsoft) IKE v2 VPN
  - authentication
    - Certificate
    - RADIUS
- ExpressRoute

Demo: VPN Gateway

Demonstration Architecture



Azure Firewall

Azure Firewall

- What is Azure Firewall?
- Azure Firewall Features
- Demo: Azure Firewall

What is Azure Firewall?

- Whiteboard

Azure Firewall Features

- L3 – L7 policies
- Microsoft threat intelligence
- High availability
- High scalability
- Multiple public IP addresses
- DNAT/SNAT
- Integrated monitoring
- Compliance certifications

Demo: Azure Firewall

Implement Azure Bastion Service

Implement Azure Bastion Service

- Azure VM Connectivity
- Azure Bastion Service
- Demo: Azure Bastion Service

Azure VM Connectivity

Azure Bastion Service

- Requires dedicated subnet
  - AzureBastionSubnet
  - /27 or larger
- No public IP required
- No NSG rules required
- Browser-based

Demo: Azure Bastion Service

Azure Virtual WAN

Azure Virtual WAN

- Azure WAN Topologies
- Azure Virtual WAN
- Demo: Virtual WAN

Azure WAN Topologies

- Whiteboard

Azure Virtual WAN

- Hub and Spoke topology
- Automatic configuration
- Similar but separate resources
  - virtualWan
  - Hub
  - Hub virtual network connection
  - Hub-to-hub connection
  - Hub route table
  - Site

Demo: Virtual WAN