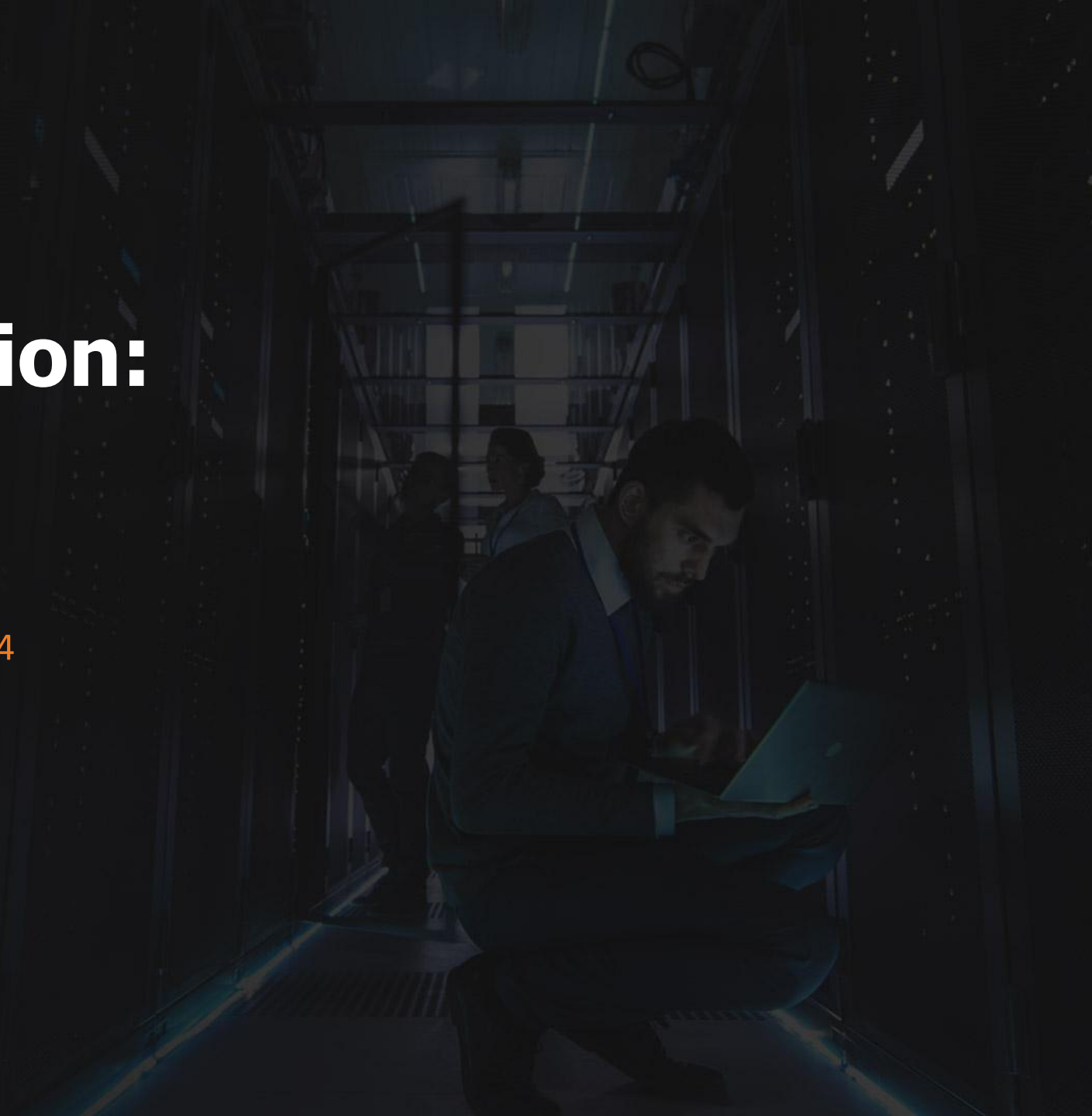




Azure Administration: Virtual Network Management

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

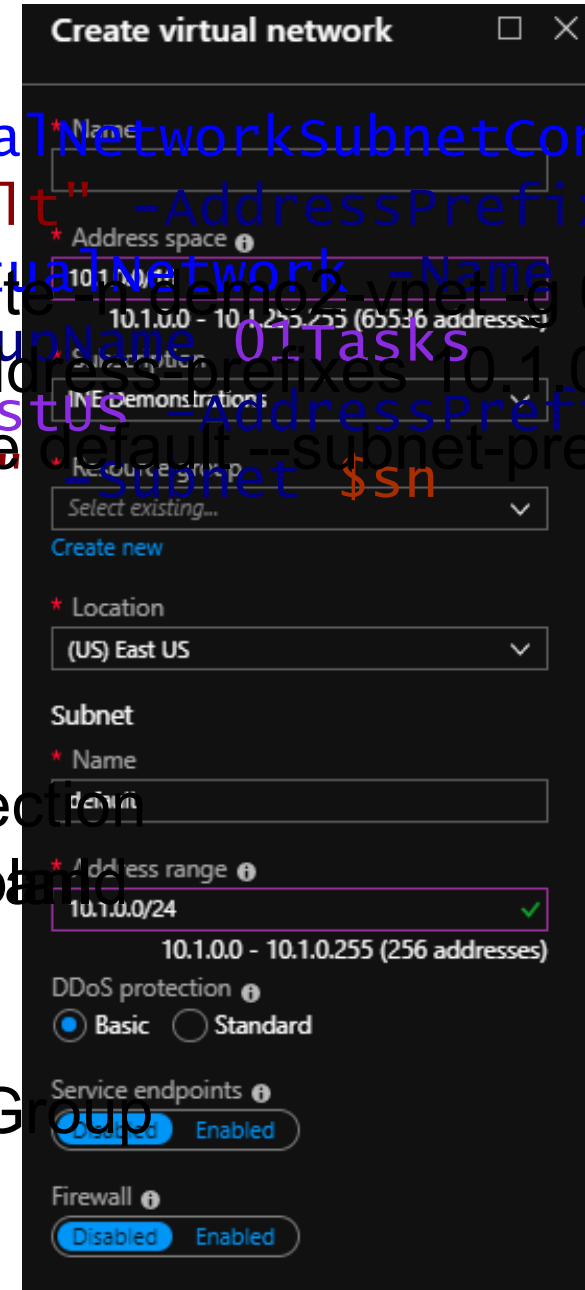
```
$sn = New-AzVirtualNetworkSubnetConfig `
    -Name "default" -AddressPrefix "10.0.0.0/24"
$vn = New-AzVirtualNetwork -Name "demo-vnet" `
    -ResourceGroupName "01Tasks" `
    -Location EastUS -AddressPrefix "10.1.0.0/16" `
    -SubnetName "default" -SubnetPrefix "10.1.0.0/24"
```

Network options

- EnableDdosProtection
- DdosProtectionPlan
- DnsServers

Subnet options

- NetworkSecurityGroup
- RouteTable
- ServiceEndpoint



The screenshot shows the 'Create virtual network' form in the Azure portal. The form is filled out with the following values:

- Name:** demo-vnet
- Address space:** 10.1.0.0 - 10.1.0.255 (65536 addresses)
- Location:** (US) East US
- Subnet:**
 - Name:** default
 - Address range:** 10.1.0.0/24 (10.1.0.0 - 10.1.0.255 (256 addresses))
- DDoS protection:** Basic (selected)
- Service endpoints:** Enabled
- Firewall:** Disabled

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

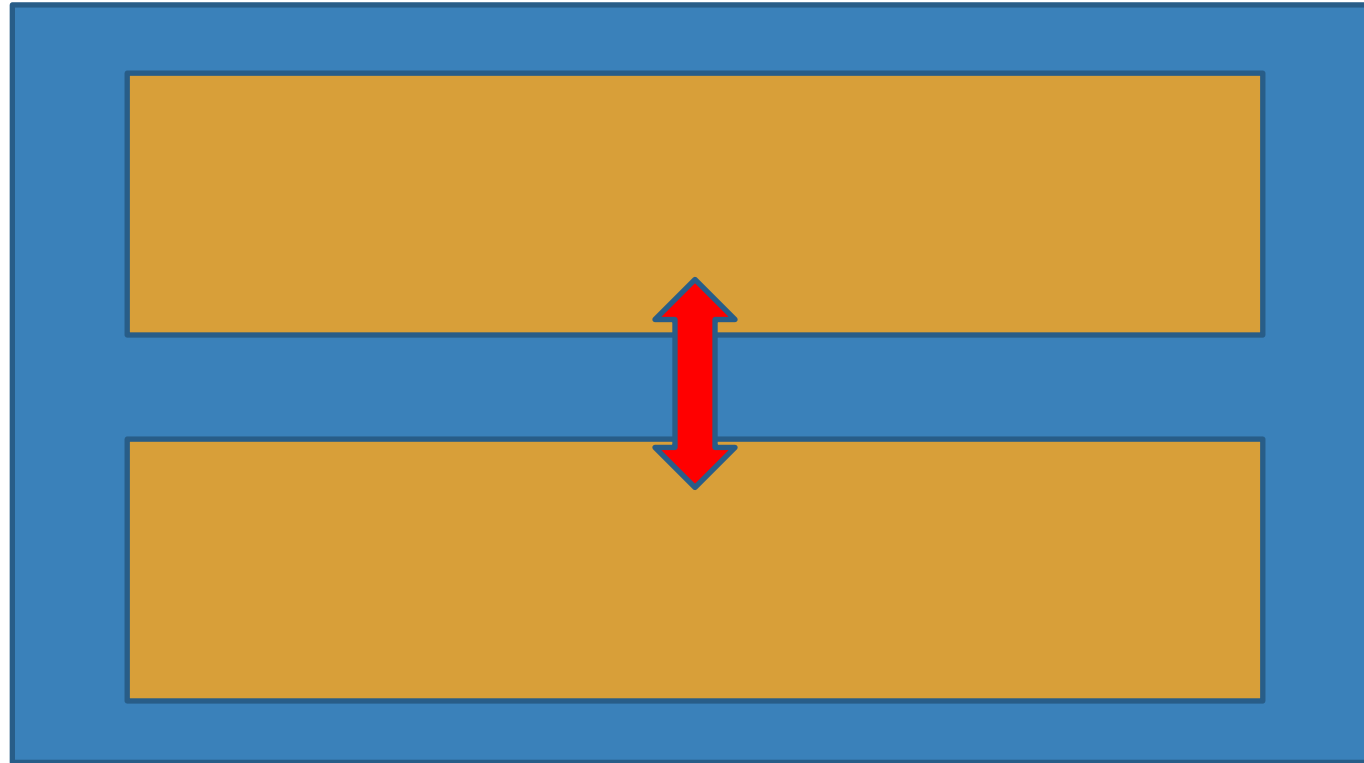


Azure Network Routing

Azure Network Routing

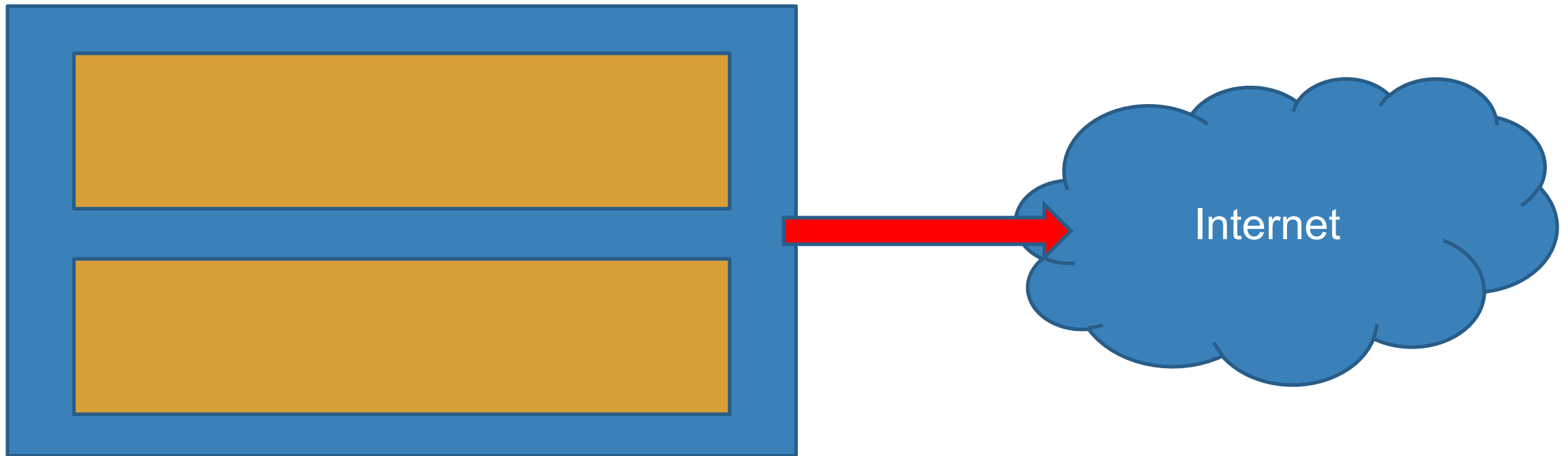
- Azure System Routes
- Azure Route Tables
- Demo: Azure Routing

Azure System Routes



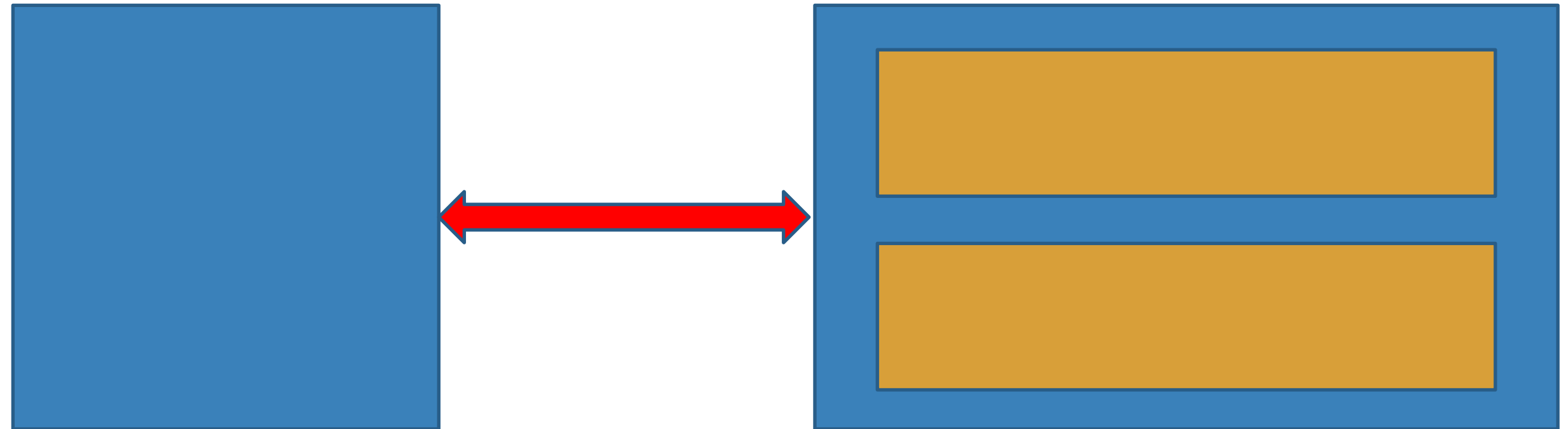
Virtual network

Azure System Routes



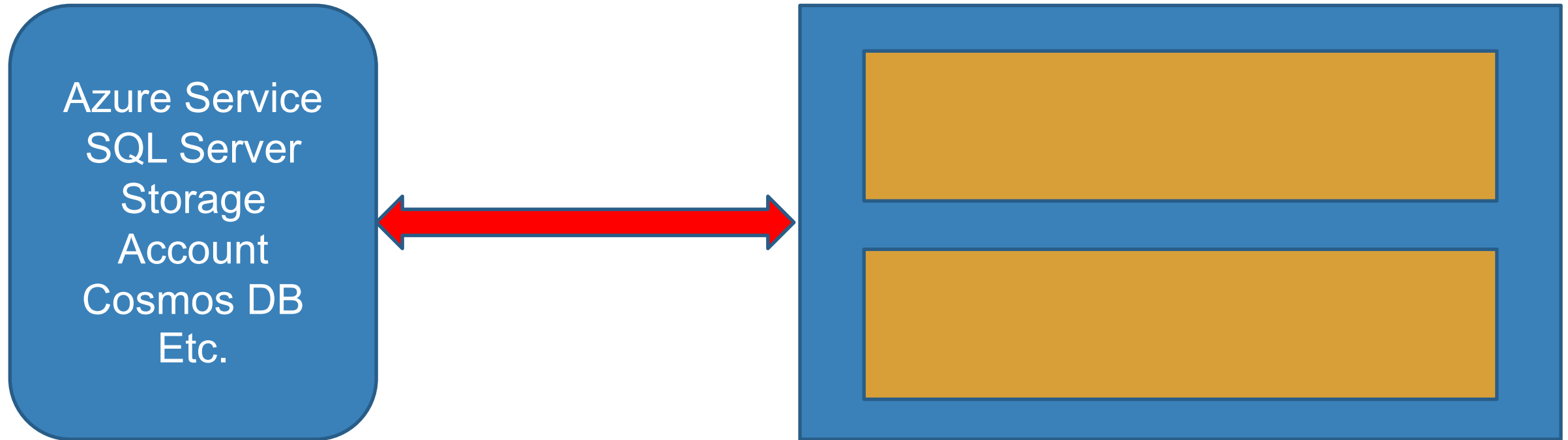
Internet

Azure System Routes



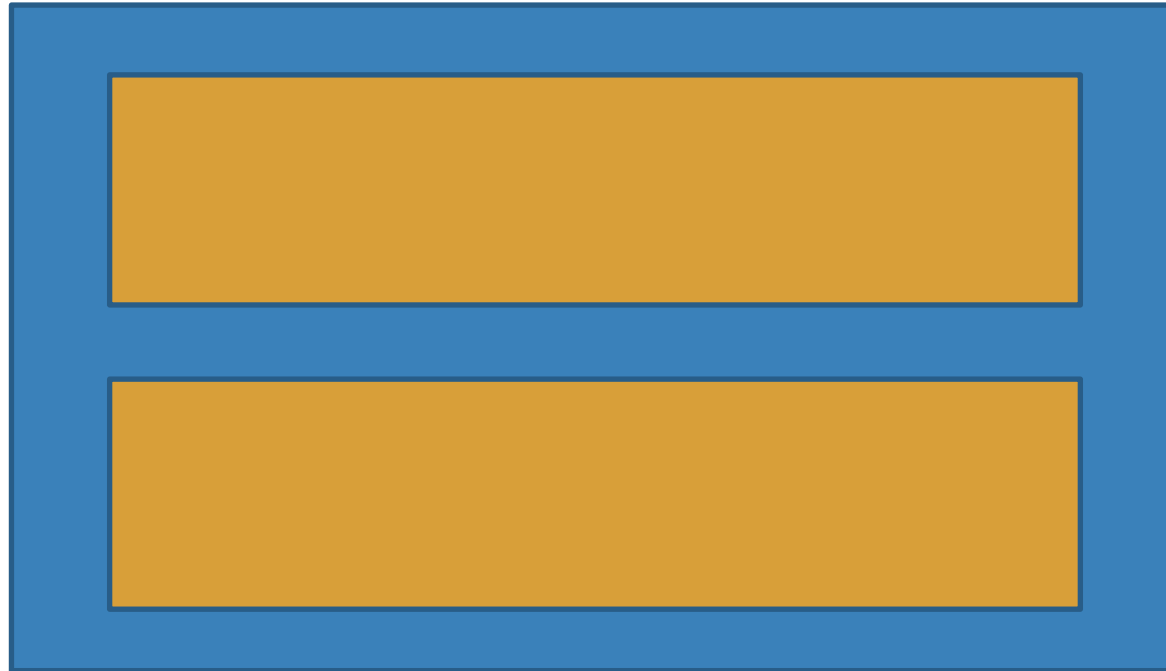
Peering / Virtual Network Gateway

Azure System Routes



Service Endpoint

Azure System Routes



None

Route Tables

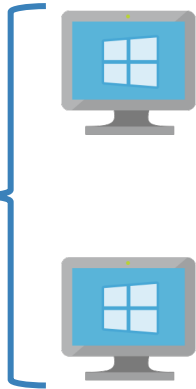
- Applied to subnets
- Route rules
 - + prefix
 - + next-hop
 - + virtual appliance (requires next hop IP address)
 - + virtual network gateway (VPN type only. ExpressRoute via BGP)
 - + virtual network
 - + internet
 - + none
- Route selection
 - + longest prefix (10.0.0.0/24 -> 10.0.0.0/16)
 - + user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

Demo: Azure Routing

Demonstration Architecture

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server Router NVA



Web Server





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

* Source ⓘ
Any

* Source port ranges ⓘ
*

* Destination ⓘ
Any

* Destination port ranges ⓘ
8080

* Protocol
Any TCP UDP ICMP

* Action
Allow Deny

* Priority ⓘ
100

* Name
Port_8080

Description

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

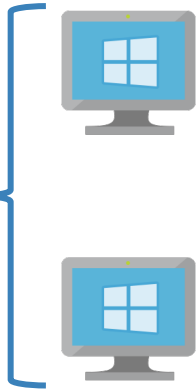
Application Security Groups

Demo: Apply Azure NSGs

Demonstration Architecture

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server Router NVA



Web Server





Monitor Azure Virtual Networks

Monitor Azure Virtual Networks

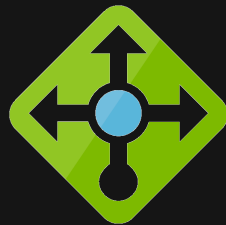
- Monitor Network Components
- Network Watcher
- Troubleshoot Networking
- Network Performance Monitor
- Demo: Network Monitoring

Monitor Virtual Networks

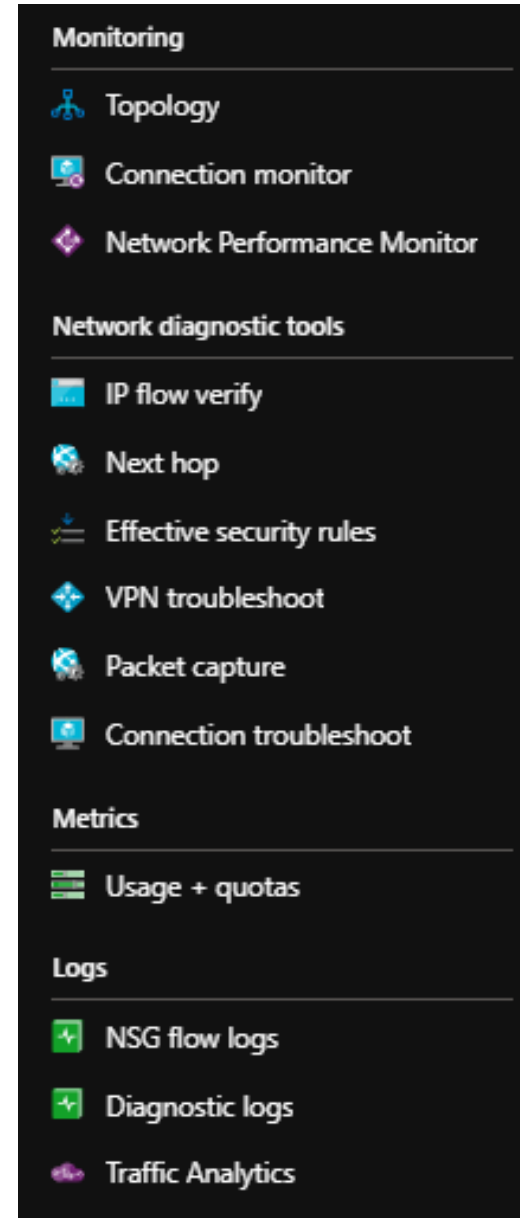


Virtual network

- + Network components
- + Network watcher
- + Troubleshooting



Load balancer



52.186.64.255

Public IP address



Application gateway

Network Performance Monitor



➤ Demo: Network Monitoring

Demonstration Architecture

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server



Router NVA



Web Server





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

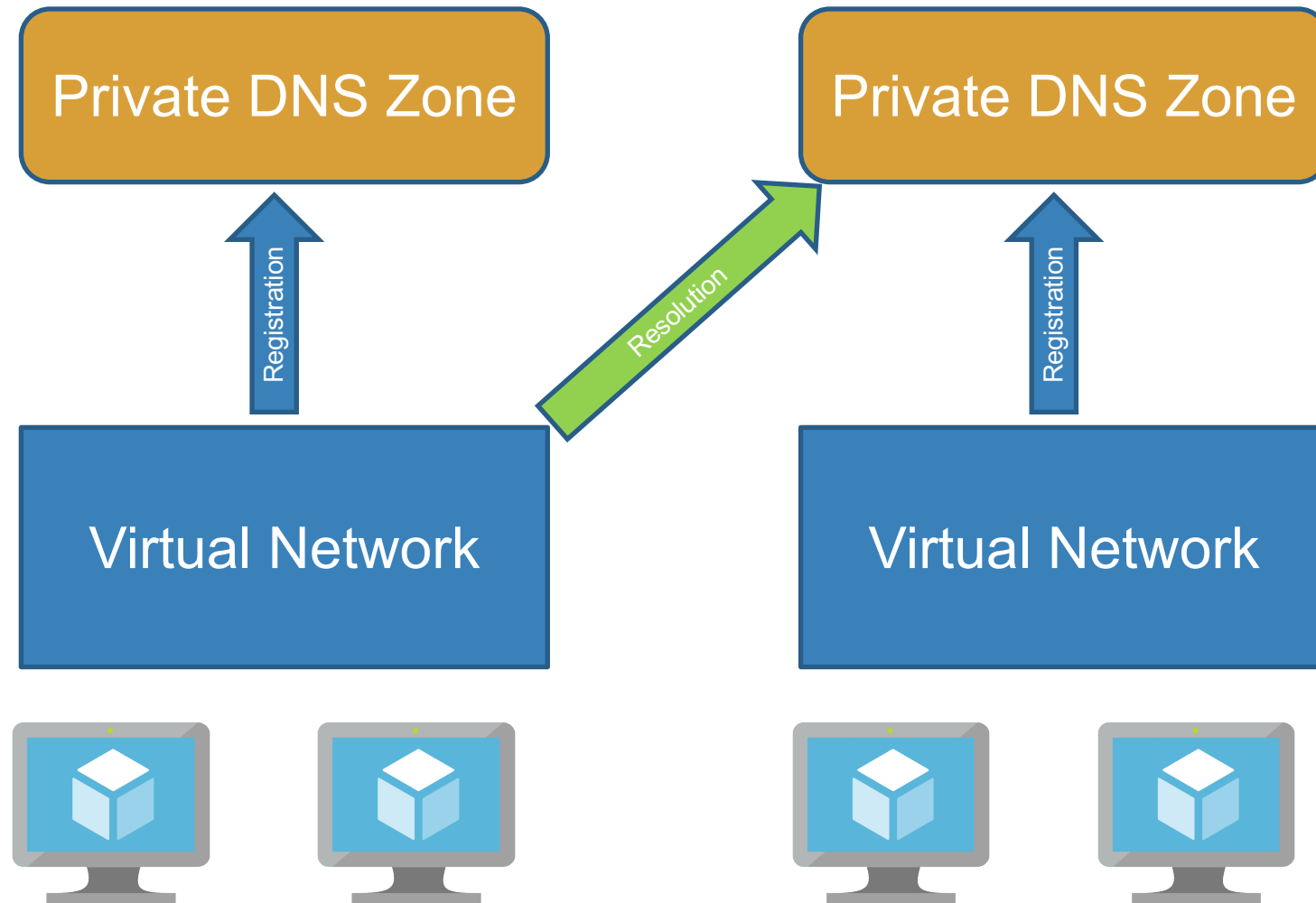


Configure Private Azure DNS

Configure Private Azure DNS

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

Azure Private DNS Zones

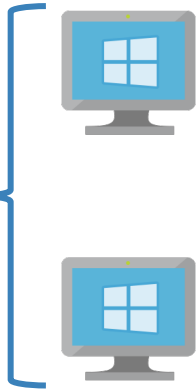


Demo: Implement Private DNS Zones

Demonstration Architecture

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server Router NVA



Web Server





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

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server



Router NVA



Web Server



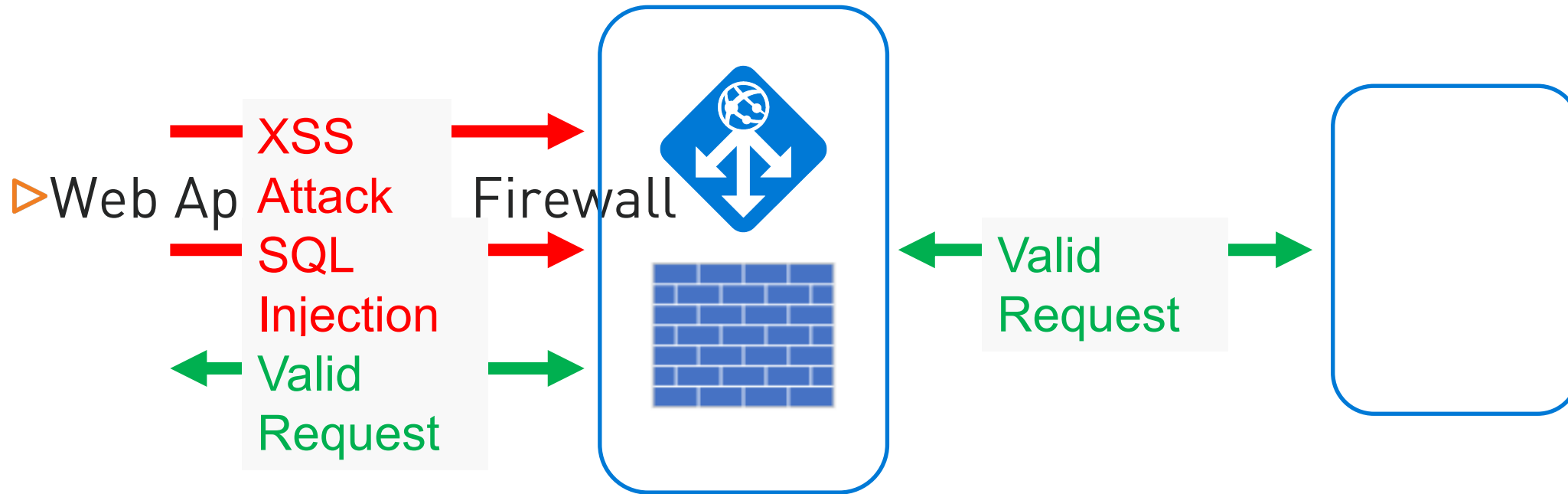


Configure Application Gateway

Configure Application Gateway

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

Application Gateway Features



Application Gateway Features

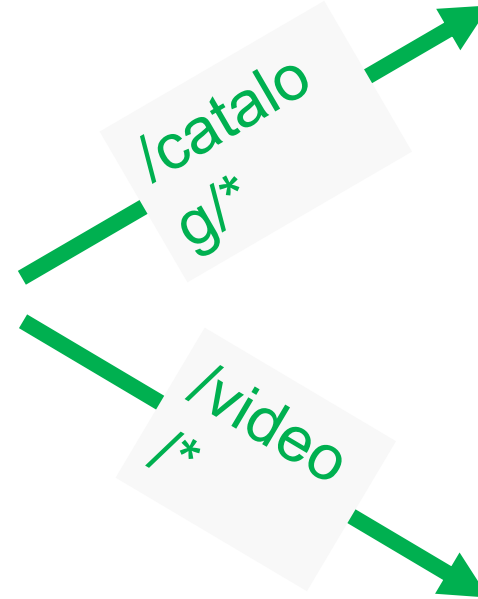
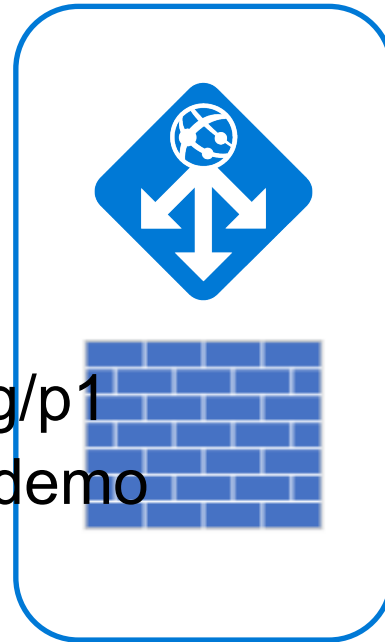
▶ Path based routing

ine.co

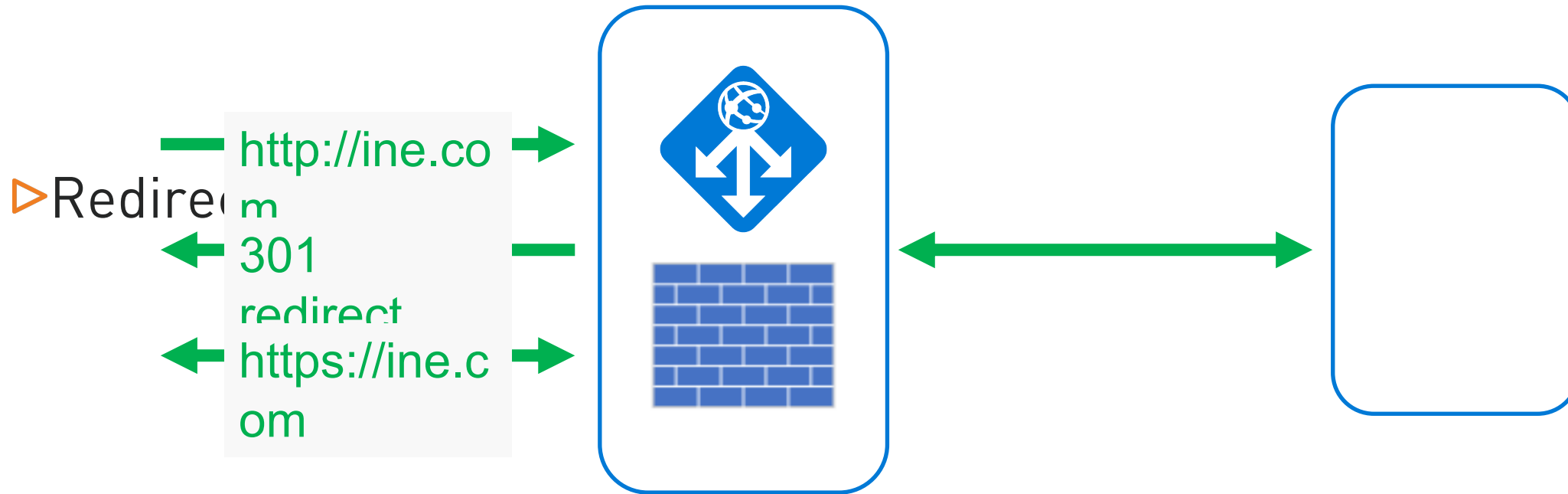
m

http://ine.com/catalog/p1

http://ine.com/video/demo



Application Gateway Features

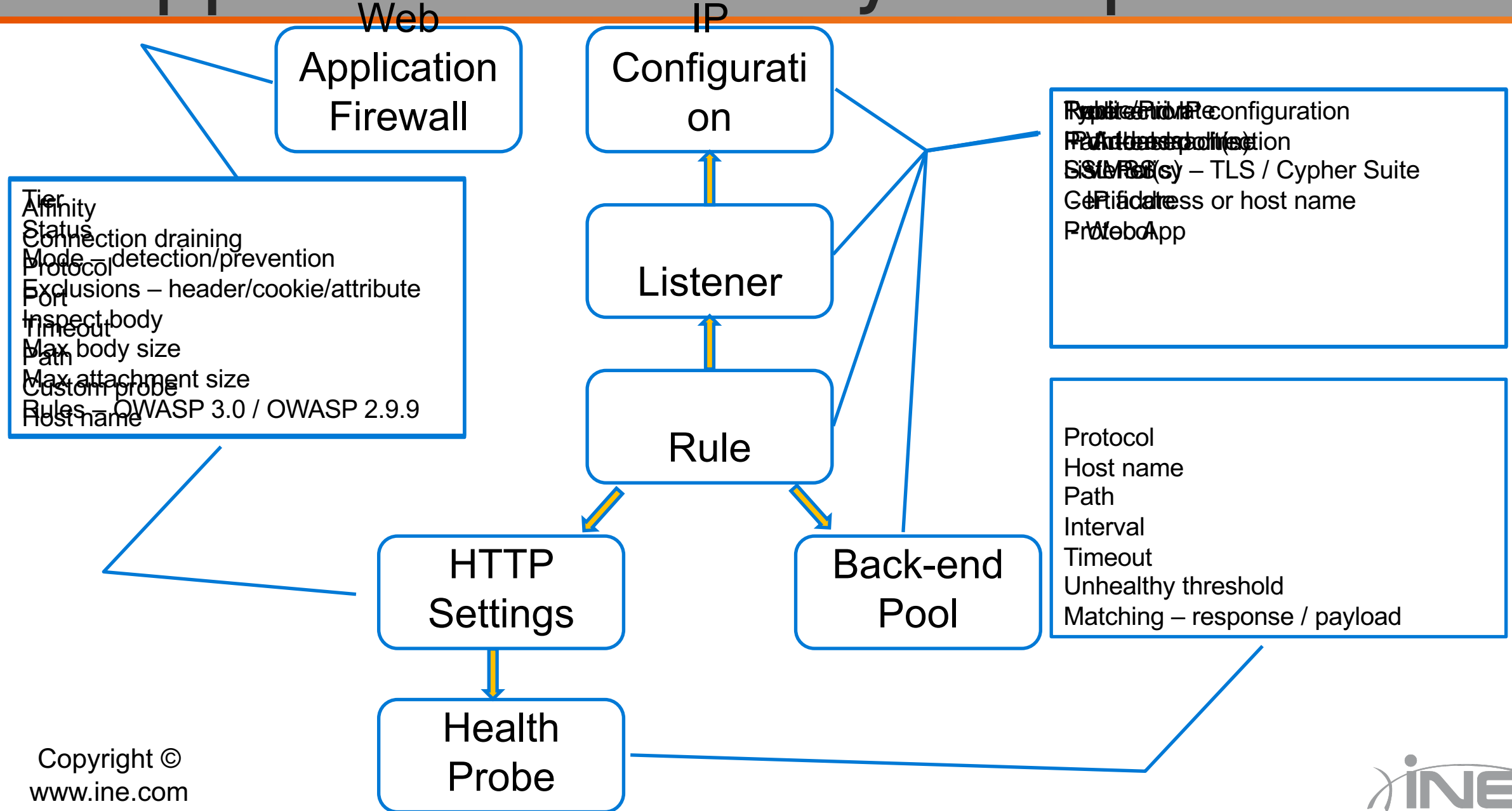


Application Gateway Features

▶ Other Features

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

Application Gateway Components

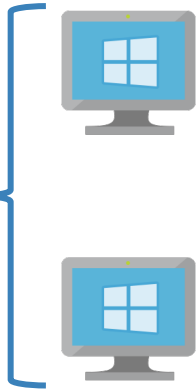


Demo: Application Gateway

Demonstration Architecture

w-winsvr-vnet

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Servers



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Monitor Server Router NVA



Web Server





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

Virtual
Network

Virtual
Network

Azure Network Topologies

Hub and Spoke

On-premises

Virtual
Network

Virtual
Network

Virtual
Network

Virtual
Network



Configure Virtual Network Peering

Configure Virtual Network Peering

- Virtual Network Peering
- Demo: Virtual Network Peering

Virtual Network Peering

* Name of the peering from hub-VNet to remote virtual network

Peer details

Virtual network deployment model ⓘ

☒ Resource manager ☐ Classic

☐ I know my resource ID ⓘ

* Subscription ⓘ

INE Demonstrations

* Virtual network

Search virtual network

* Name of the peering from remote virtual network to hub-VNet

Configuration

Configure virtual network access settings

Allow virtual network access from hub-VNet to remote virtual network ⓘ

Allow virtual network access from remote virtual network to hub-VNet ⓘ

Configure forwarded traffic settings

Allow forwarded traffic from remote virtual network to hub-VNet ⓘ

Allow forwarded traffic from hub-VNet to remote virtual network ⓘ

Configure gateway transit settings

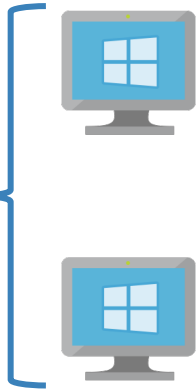
☐ Allow gateway transit ⓘ

Demo: Virtual Network Peering

Demonstration Architecture

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server Router NVA



Web Server





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

w-winsvr-vnet

Windows
Servers



U-websvr-vnet

Monitor Server



Router NVA



Web Server





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