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Managing Networking

In this chapter, we cover the following recipes:

* Configure IP Addressing
* Testing Network Connectivity
* Installing DHCP
* Using DHCP
* Configure DHCP Scopes and Options
* Implementing DHCP Fail Over/Load Balancing
* Deploying DNS in the Enterprise
* Configuring DNS Forwarding
* Managing DNS Zones and DNS Resource Records

# Introduction

At the heart of every organization is the network—the infrastructure that enables your client and server systems to interoperate. Windows has included networking features since the early days of Windows for Workgroups 3.1 (and earlier with Microsoft LAN Manager).

Every server or workstation in your environment needs to have a correct IP configuration. While IPv6 is gaining in popularity, most organizations rely on IPV4. In the Configuring IP addressing recipe, we look at how to set a network interface's IPv4 configuration, including DNS settings.

Many organizations assign a static IPv4 addresses to most server systems. The servers used throughout this book, for example, make use of static IP addresses. For client hosts, and for some servers, an alternative to assigning a server a static IP addresses is to use Dynamic Host Control Protocol (DHCP). DHCP is a network management protocol that enables a workstation to lease an IP address (and re-lease it when the lease expires). You set up a DHCP server to issue IP address configuration to clients by using the *Installing and authorizing a DHCP* server recipe.

Once your DHCP server is set up, you can use the *Configuring DHCP scopes* recipe to set up the details that your DHCP server is to hand out to clients. In the *Configuring IP address from static to DHCP* recipe, we set a network interface to get IP configuration from DHCP.

In the *Configuring DHCP failover and load balancing* recipe, we deploy a second DHCP server and configure it to act as a failover/load balancing DHCP service.

In the final recipe of this chapter, *Configuring DNS zones and resource records*, you configure the DNS server on DC1 with zones and additional resource records. Before you can begin to administer your Windows Server 2019 infrastructure, you need to create an environment in which you can use PowerShell to carry out the administration.

# Configure IP Addressing

By default, Windows uses DHCP to configure all NICs that are the Windows installation process discovers when you install Windows. Once you complete the installation of Windows, you can use the control panel applet (ncpa.cpl). the network shell console application (netsh.exe), or, of course, PowerShell to set IP configuration manually. In this recipe, you set the IP address details for SRV2 and ensure the host is registered in ther Reskit.Org DNS domain (on the DNS service running on DC1).

Setting up any host requires setting an IP address, a subnet mask and a default gateway which you do in the first part of this recipe. Then you configure SRV2 (which is a a workgroup host), to register with the DNS Server on DC1.Reskit.Org. This raises some challenges. By default, when you created DC1.Reskit.Org as a DC, the DNS Zone for the domain is set to only allow secure updates. So, again, by default, a workgroup host can not register. You can overcome this by setting the zone to allow all updates. But this could be dangerous as it allows ANY host to, potentially, register their address. A second challenge is that since SRV2 is not a domain member, remoting to DC1 fails. A solution to that issue is to set the WinRM service to trust all hosts. This to has security implications you should consider before using this approach in production.

## Getting Ready

This recipe uses SRV2, a recently added workgroup host, which is, initially, configured as a DHCP client.

## How to do it...

1. Discovering the network adapter, adapter interface and adapter interface index

$IPType    = 'IPv4'

$Adapter   = Get-NetAdapter |  Where-Object Status -eq 'Up'

$Interface = $Adapter | Get-NetIPInterface -AddressFamily $IPType

$Index     = $Interface.IfIndex

Get-NetIPAddress -InterfaceIndex $Index -AddressFamily $IPType |

  Format-Table -Property Interface\*, IPAddress, PrefixLength

1. Setting a new IP address for the NIC

$IPHT = @{

  InterfaceIndex = $Index

  PrefixLength   = 24

  IPAddress      = '10.10.10.51'

  DefaultGateway = '10.10.10.254'

  AddressFamily  = $IPType

}

New-NetIPAddress @IPHT

1. Verifying the new IP address

Get-NetIPAddress -InterfaceIndex $Index -AddressFamily $IPType |

  Format-Table IPAddress, InterfaceIndex, PrefixLength

1. Setting DNS Server IP address

$CAHT = @{

  InterfaceIndex  = $Index

  ServerAddresses = '10.10.10.10'

}

Set-DnsClientServerAddress @CAHT

1. Verifying the new IP configuration

Get-NetIPAddress -InterfaceIndex $Index -AddressFamily $IPType |

  Format-Table

1. Testing that SRV2 can see the domain controller

Test-NetConnection -ComputerName DC1.Reskit.Org |

  Format-Table

1. Creating a credential for DC1

$U    = 'Reskit\Administrator'

$PPT  = 'Pa$$w0rd'

$PSC  = ConvertTo-SecureString -String $ppt -AsPlainText -Force

$Cred = [pscredential]::new($U,$PSC)

1. Setting WinRM on SRV2 to trust s

$TPPATH = 'WSMan:\localhost\Client\TrustedHosts'

Set-Item -Path $TPPATH -Value 'DC1' -Force

Restart-Service -Name WinRM -Force

1. Enabling non-secure updates to Reskit.Org DNS domain

$DNSSSB = {

  $SBHT = @{

    Name          = 'Reskit.Org'

    DynamicUpdate = 'NonsecureAndSecure'

}

  Set-DnsServerPrimaryZone @SBHT

}

Invoke-Command -ComputerName DC1 -ScriptBlock $DNSSSB -Credential $Cred

1. Ensuring SRV2 registers within the Reskit.Org DNS zone

$DNSCHT = @{

  InterfaceIndex                 = $Index

  ConnectionSpecificSuffix       = 'Reskit.Org'

  RegisterThisConnectionsAddress = $true

  UseSuffixWhenRegistering       = $true

}

Set-DnsClient  @DNSCHT

1. Registering host IP address at DC1

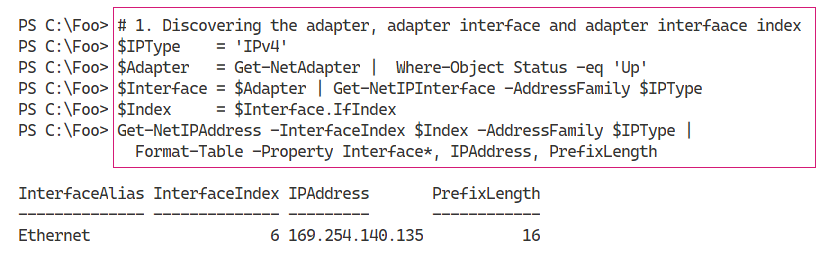
Register-DnsClient

1. Testing the DNS server on DC1.Reskit.Org correctly resolves SRV2

Resolve-DnsName -Name SRV2.Reskit.Org -Type 'A' -Server DC1.Reskit.Org

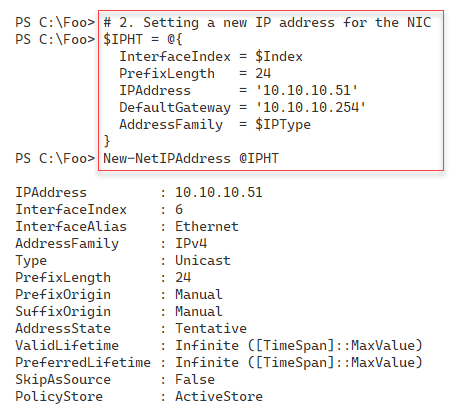
## How it works...

In step 1, you use Get-NetAdapter and Get-NetIPAddress to determine the IP address of this server. Then you display the resultant address, which looks like this:



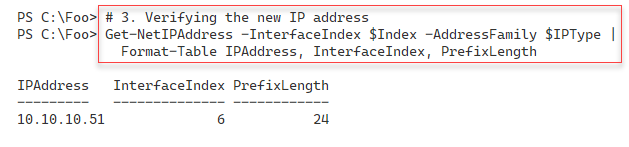
1. Insert image B1672\_01\_01.png

In step 2, you use the New-NetIPAddress cmdlet to set a static IP address on SRV2. The output looks like this:



1. Insert image B1672\_01\_02.png

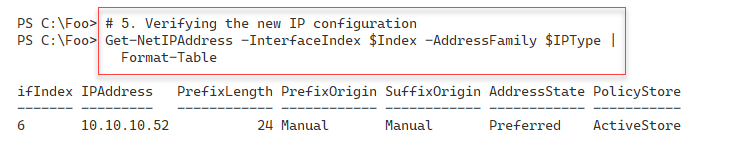
To double check that you have configured SRV2 with the correct IP address configuration, you can use the Get-NetIPaddress cmdlet. The output looks like this:



1. Insert image B1672\_01\_03.png

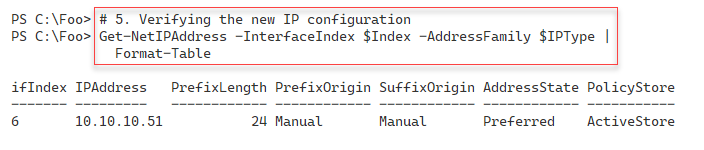
In addition to setting an IP address, subnet mask and default gateway, you also need to configure SRV2 with a DNS server address. In step 4, you use the Set‑DnsClientServerAddress cmdlet, which creates no output.

To check the updated IP configuration on SRV2, in step 5, you verify the configuration by (re)-using the Get-Get-NetIPAddress cmdlet, with output like this:



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In step 6, you use Test-NetConnection to ensure SRV2 can connect to DC1, the domain controller in the Reskit.Org domain with this as the output:



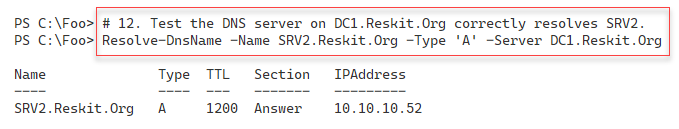
1. Insert image B1672\_01\_05.png

To enable SRV2, a workgroup computer to run commands on DC1, you need correct Windows credentials. In step 7, which creates no output, you create credentials for the Administrator user in Reskit.Org.

With step 8, you configure the WinRM service to trust DC1 explicitly. This step creates no output.

In step 9, you reconfigure the DNS Service on DC1 to enable non-secure updates to the Reskit.Org domain. In step 10, you configure SRV2 to register itself within the Reskit.Org zone on DC1. And then, in step 11, you register SRV2’s IP address within the DNS service on DC1. These three steps also produce no output.

In the final step, step 12, you query the DNS service to resolve the domain name SRV2.Reskit.Org. This step produces the following output:



1. Insert image B1672\_01\_06.png

In this recipe, you configured a workgroup server to have a static IP address. You also configure the DNS service to enable SRV2 to register a DNS record within the Reskit.Org domain. In most production scenarios, you would join SRV2 to the domain in which case DNS registration just works without needing step7 through step 11.

## There's more...

In step 5, you verify SRV2’s IP address. This test does not check SRV2’s DNS configuration. To check the DNS address as well, you could use Get-NetIPConfiguration.

In step 7, you create a credential to enable you to run commands on DC1. In this step, you use the enterprise/domain administrator account. In production, a better approach would be to create another user with a subset of the Enterprise Admin’s group's permissions then use that user to perform step 9.

In step 8, you configure WinRM to trust the DNS Server, DC1. This configuration is necessary for a workgroup environment because, by default, workgroup computers do not trust other servers when using PowerShell remoting (as you do in a later step). PowerShell remoting, by default, performs mutual authentication. Kerberos provides the necessary mutual authentication in a domain environment, while in a workgroup environment, you could use SSL to connect to DC1. By configuring SRV2 to trust DC1, you are disabling authentication of DC1 by SRV2. In a protected environment, like you have your set of Reskit.Org servers, this is acceptable. In production and especially in larger environments, a better approach is to enable SSL for remoting to hosts in separate security realms.

# Testing Network Connectivity

In today’s connected world, network connectivity is vital. When you add a new server to your infrastructure, it is useful to ensure that the server can connect to and use the network.

In this recipe, you perform necessary network connectivity tests on the newly installed SRV2 host. You should ensure that full connectivity exists before adding a server to the domain.

## Getting Ready

This recipe uses SRV2 a workgroup host. You gave this host a static IP address in “Configuring IP Addressing”.

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Installing DHCP

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Using DHCP

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Configure DHCP Scopes and Options

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Implementing DHCP Fail Over/Load Balancing

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Deploying DNS in the Enterprise

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Configuring DNS Forwarding

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure

# Managing DNS Zones and Resource Records

This recipe, blah blah

## Getting Ready

Specific stuff you need to do this recipe

## How to do it...

1. Step by step

## How it works...

Screen shots for each step that generates one

## There's more...

Some things of interest in this recipe

Repeat the recipe structure