



Operating System

Connecting Your Network to the Internet

Deployment Scenario

Abstract

In today's business, being connected to the marketplace and to your customers means getting connected to the Internet. Windows 2000 makes it easier to securely connect your network to the Internet, enabling your employees to access the information they need. This guide outlines the steps to provide secure shared Internet access to Microsoft® Windows® 2000-based clients that are directly attached to a medium-sized private network.

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*Microsoft Corporation • One Microsoft Way • Redmond, WA 98052-6399 • USA
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INTRODUCTION

In today's business, being connected to the marketplace and to your customers means getting connected to the Internet. Microsoft® Windows® 2000 makes it easier to securely connect your network to the Internet, enabling your employees to access the information they need. Connecting a medium-sized office network to the Internet has traditionally been a difficult process requiring separate machines and extensive knowledge of network devices. For many, making a connection to the Internet seemed costly and difficult to manage.

With Windows 2000 Server, making a connection to the Internet is easy, secure, and can be accomplished with relatively inexpensive hardware and basic Internet service provider (ISP) services.

This guide is intended for users of medium-sized Windows 2000 domain-based networks who want to set up Internet access and share it with local area network clients. It assumes a basic understanding of domain-based networks, Domain Naming Services (DNS), and Dynamic Host Configuration Protocol (DHCP). This guide is not intended as a comprehensive review of all routing features of Windows 2000, rather, it is a focused guide of the basic Internet gateway capabilities.

Scenario Requirements

This document will walk you through setting up a Windows 2000-based server as an Internet connection server that shares access with a local area network. This guide builds on the network configuration in the “Upgrading a Windows NT Domain to Windows 2000 Active Directory” deployment scenario guide. (It shows how to configure a single domain-based Windows 2000 network with DNS and DHCP services enabled.)

To connect to the Internet, this guide assumes you have an active account with an ISP and a physical connection to the Internet. This could be a dial-up connection, like an analog modem or ISDN, or a dedicated connection like a cable modem or Digital Subscriber Line (DSL).

To configure the server for Internet access sharing, you will need to install the Routing and Remote Access Services (RRAS) that is included with the Optional Windows 2000 components package. To install this component on your Windows 2000 Server, click **Start**, point to **Programs**, point to **Administrative Tools**, click **Configure your server**, click **Networking** and click **Routing**. Follow the instructions on this page to install the RRAS. You must have network administrator rights to configure this setup.

Scenario Tasks

In this guide you perform the following tasks:

Setup and Management Tasks

- Network setup and configuration using the Internet Connection services. Includes an overview of common ISP authentication issues incurred when using the wizard.
 - Configuration and setup of Routing and Remote Access Service edge of network gateway
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INTERNET CONNECTION SETUP TASKS

Overview

Routing and Remote Access Service (RRAS), integrated in Windows 2000 Server, provides a variety of capabilities such as connecting remote users, connecting office networks, and connecting networks to the Internet. This guide shows you how to configure your Windows 2000 Server to provide a basic outbound connection to the Internet that can be shared with other computers on your internal network.

To set up your network for Internet access, you need to:

1. Establish an Internet account with an ISP.
2. Configure Windows 2000 Server for Internet access.
3. Update your local DNS server for Internet naming resolution.

Establishing an Internet account with an ISP

You must establish an account with an Internet service provider (ISP) to access the Internet. An ISP provides the following information to configure your server and network environment:

- **Account username and password.** Used for authentication purposes.
- **Assigned IP Address.** This is your public IP address associated with your account. This can be statically or dynamically assigned.
- **ISP DNS Server Address.** Used to forward DNS requests for Internet names to the ISP's DNS server.
- **Modem Access Number.** The ISP's access number if you are connecting through demand dial.

Note: If you plan to host a Web server or a remote access server, you need to request a static IP address or have an ISP that supports Dynamic DNS. Outbound Internet traffic will work with a dynamically assigned IP address but external computers will not be able to connect to your network over the Internet.

Before you set up Internet sharing, check with your ISP about any licensing limitations on shared access through a single ISP connection.

Configuring Windows 2000 Server for Internet Access

Select a computer on your network domain that will perform as the Internet connection server. This computer requires Windows 2000 Server with Routing and Remote Access Services (RRAS) installed and two network connections: one to the internal network and one that will connect to the Internet. The internal connection should be a Network Interface Card (NIC) while the external connection can either be a NIC or a modem, depending on the type of connection required.

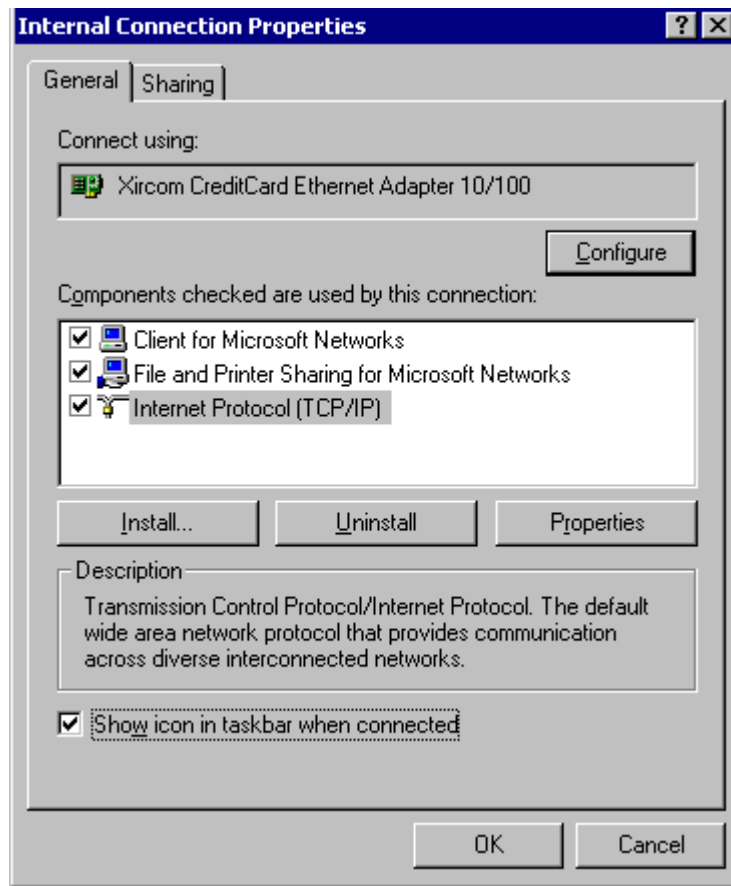
Assigning IP addresses

If your server is already connected to the network, the Internal NIC should already have an IP address that was dynamically assigned by the local DHCP server. Because this server will be used as the Internet Connection Server, you will need to assign a static IP address to the Internal NIC. This static IP address should be selected from the DHCP Excluded Address Range defined in the DHCP New Scope Wizard, explained in "Upgrading a Windows NT Domain to Windows 2000 Active Directory" deployment guide

To communicate the server's new role as an Internet gateway to all clients on the network, you will also need to add this static IP address to the Router (Default Gateway) list in the New Scope Wizard.

For this guide, we assume that the Internal NIC is assigned a reserved static IP Address of 10.10.1.90. We also assume that the ISP assigned a static public IP address of 169.254.0.20 to your company. The public IP address should be assigned to the external Internet connection. To assign IP addresses to NICs,

1. Select **Start**, point to **Settings**, point to **Network and Dial Up Connections**, right click the name of the network interface (Internal Connection) and select **Properties**.



2. In the **General** tab, select **TCP/IP** and click **Properties**. Click **Use the following IP address** and type in the assigned IP address. Click **OK** to accept the changes.
3. Repeat these steps for the External Internet Connection NIC but assign the static IP address provided by your ISP.

Note: When you have two NICs installed on the Server, you can identify the Internal and External NICs. Unplug the network connection cables from both NICs. Take the cable that is connected to your LAN and plug it back into a NIC. Right click **My Network Places** and click **Properties**. The icon that is illuminated is your active Internal Connections NIC. You can rename this NIC by right clicking and selecting **Rename**.

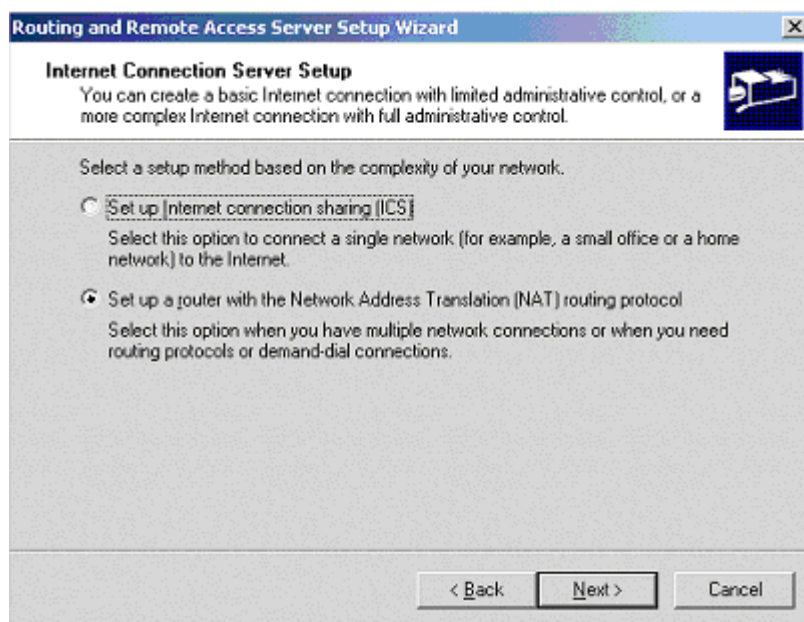
RRAS can be configured to provide the following networking services:

- Internet Connection Server provides secure access to the Internet for all client computers on the local area network.
- Remote Access Server allows computers to remotely connect to the private network using modem dial-up connections.
- Virtual Private Network Server provides secure remote access over the Internet, rather than over dial-up connections.
- Network Router expands your network by providing connectivity to other

networks.

To Enable Routing

1. Click **Start**, point to **Programs**, point to **Administrative Tools**, and click **Routing and Remote Access**.
2. Right click the server, in this case Litware1(local), and choose **Configure Routing and Remote Access Service** from the menu. The Routing and Remote Access Setup Wizard appears. Click **Next** to view choices for several default server roles.
3. Select Internet Connection Server and click **Next**. Choose **Set up Router with the Network Address Translation (NAT) routing protocol** as shown below.



4. Select a method for Internet connection.

Internet Connection Sharing is more appropriate for smaller networks such as the home network or the small office. Medium-sized networks should enable the routing and NAT features for Internet access sharing. The NAT feature relies on a single IP address for the public Internet and translates all internal client traffic to and from this IP address.

By setting up NAT, companies benefit by:

- **Lowering cost.** NAT technology allows you to share a single public IP address with many internal clients, avoiding the cost of setting up multiple public Internet address accounts.
- **Increasing security.** By hiding the IP addresses of internal clients and servers

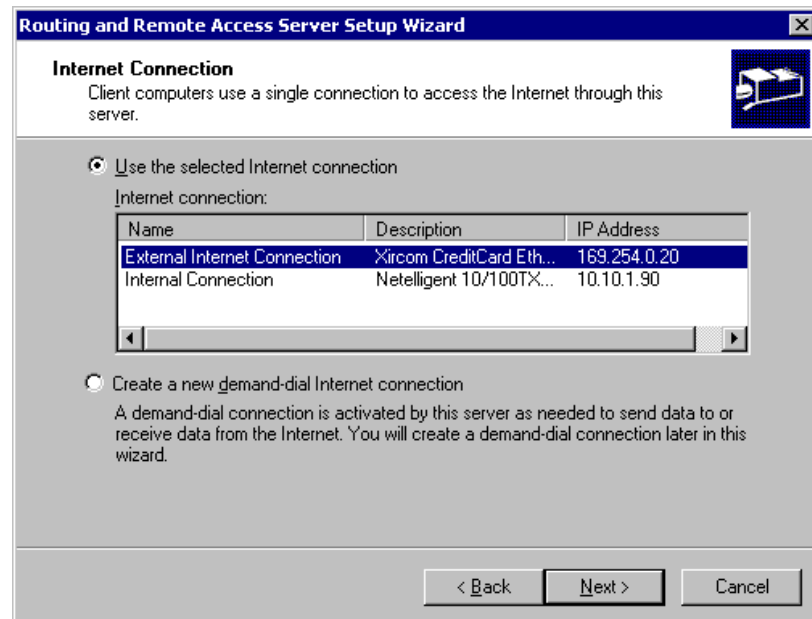
from the Internet, NAT provides an increased level of intranet security.

Note: RRAS can configure Internet connections that are created on demand or remain operational at all times. If you are setting up Demand Dial, skip the next section and proceed to the “Creating a Demand-Dial Internet Connection” section below.

Creating a Dedicated Internet Connection

In this scenario, we have two NICs, one Internal and the other External. The Internal NIC is connected to the network and has the static IP address of 10.10.1.90. The External NIC should be configured with the IP address assigned to you by your ISP, in this case 169.254.0.20. (We defined this earlier in the section “Assigning Reserved IP Addresses with DHCP”.)

1. Select **Use the selected Internet connection**, click the NIC connected to the Internet and click **Next** as shown below.



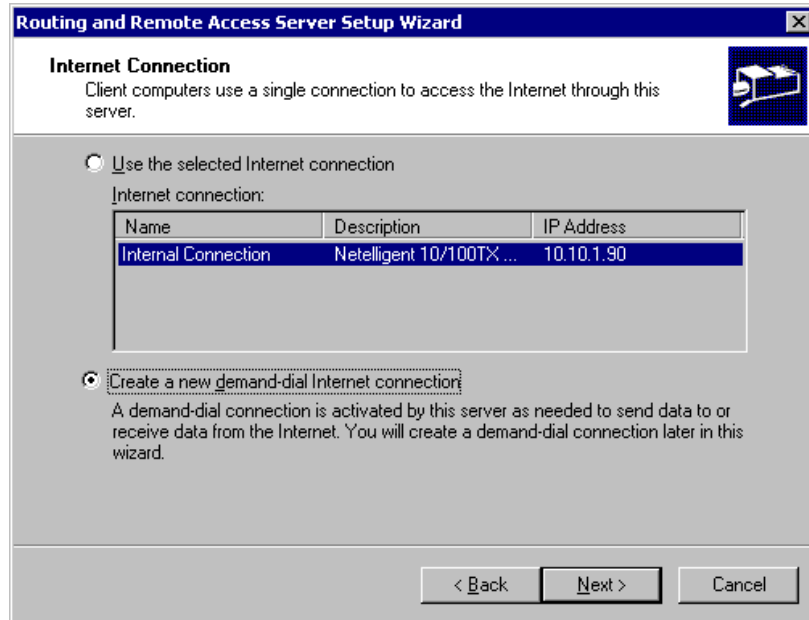
2. Click **Finish** setup.

You have finished configuring your RRAS server as an Internet Connection Server with a dedicated network connection. Skip the next section unless you are planning to create a demand-dial Internet connection.

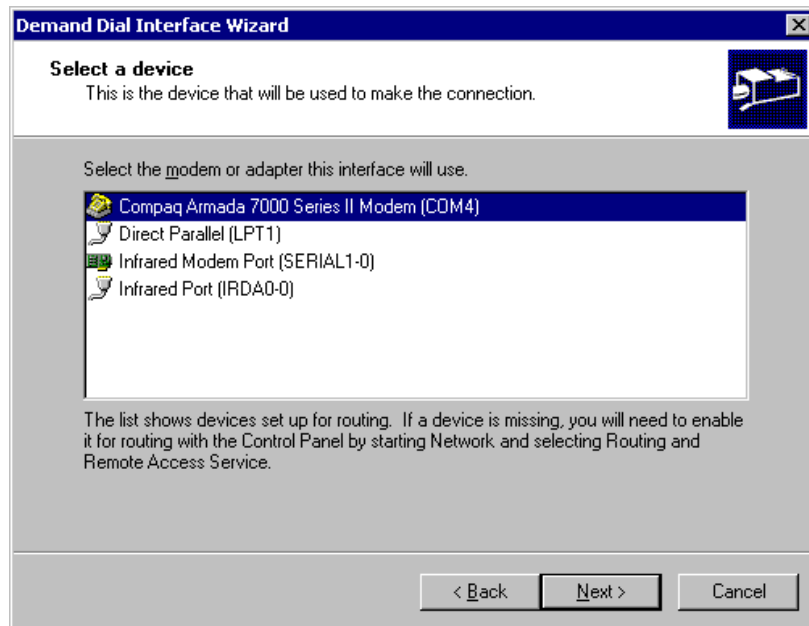
Creating a Demand-Dial Internet Connection

Instead of having a constant connection to the Internet, you may choose to connect only when your internal network users require access. RRAS can automate the connection process whenever someone tries to access the Internet. In this scenario, we have a modem for External Internet connectivity instead of a NIC. The external modem will require the ISP's modem access telephone number.

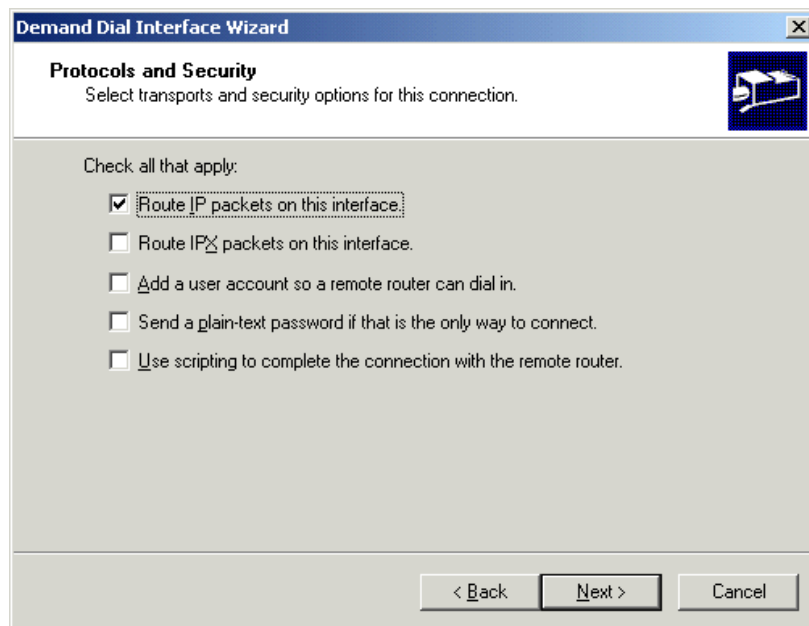
1. Follow steps 1 through 4 in the **Enable Routing** section above. In the Internet Connection dialog box, choose **Create a new Demand-Dial Internet Connection** as shown below.



2. Click **Next** to apply changes and start the Demand Dial Interface Wizard.
3. Enter a descriptive name for the new Demand Dial interface and click **Next**.
4. Choose Connect using a modem, ISDN adapter, or other physical device and click Next.
5. Select a modem as the connection device and click **Next** as shown below.



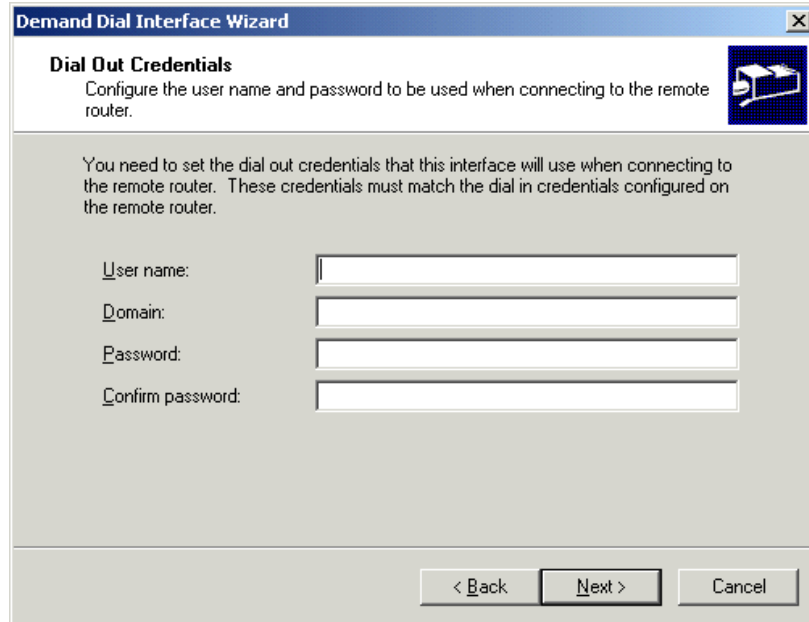
6. Enter the telephone phone number provided by your ISP and click **Next**.
7. Choose the desired protocols and security. You can customize this connection with scripting and custom authentication. You will not be able to choose routing for protocols that are not installed on the system. Select **Route IP packets on this interface** and click **Next** as shown below.



8. Specify Dial-Out credentials for the remote router as shown below. This is your

ISP user name and password that will authenticate you with their systems. Click **Next** to continue.

Note: ISPs who are not using Microsoft technology will not require a Domain and Domain password. If this applies to your ISP, you will need to leave these fields blank. If you supply a domain when none is required, authentication will fail.



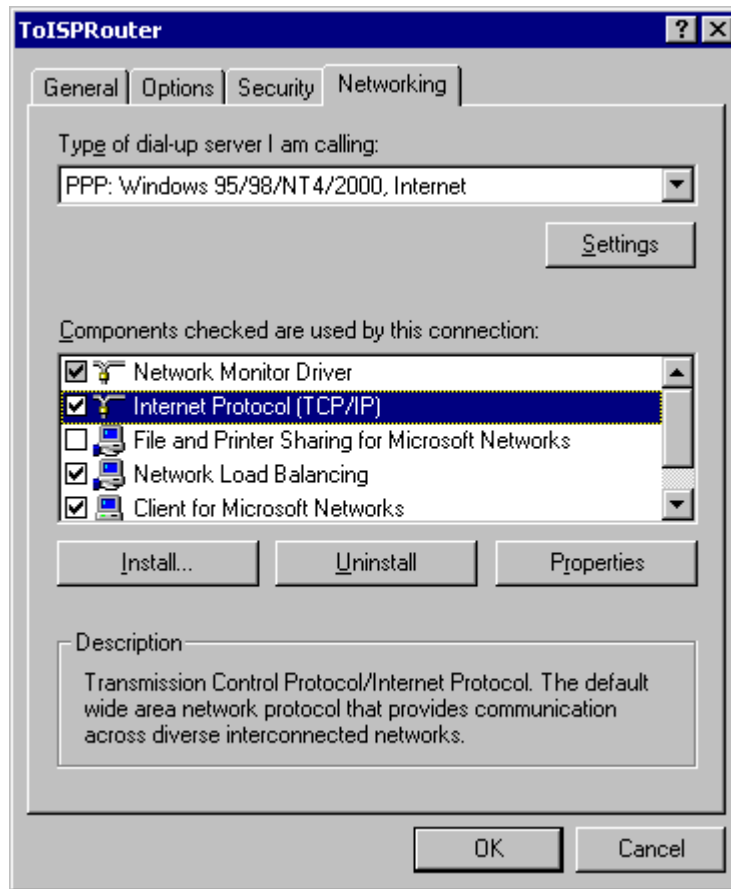
The screenshot shows a Windows dialog box titled "Demand Dial Interface Wizard". The main heading is "Dial Out Credentials". Below the heading, it says "Configure the user name and password to be used when connecting to the remote router." There is a small icon of a computer and a network card. The main text reads: "You need to set the dial out credentials that this interface will use when connecting to the remote router. These credentials must match the dial in credentials configured on the remote router." Below this text are four input fields: "User name:", "Domain:", "Password:", and "Confirm password:". At the bottom of the dialog are three buttons: "< Back", "Next >", and "Cancel".

9. Click **Finish** to complete the Demand Dial Interface Wizard.

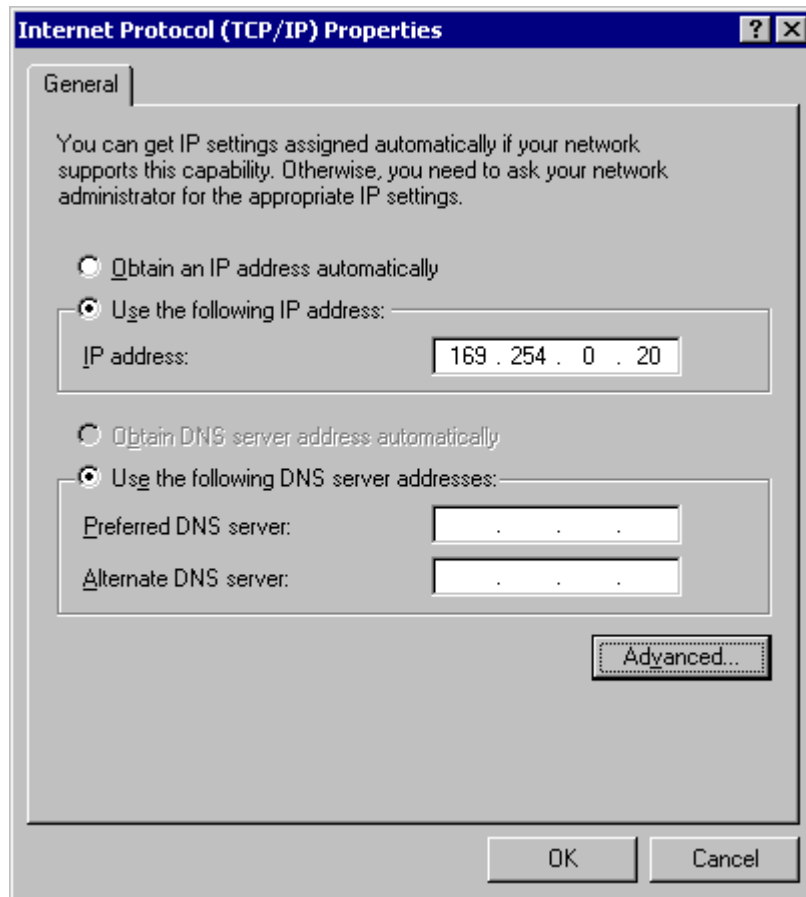
Demand Dial Internet configuration

To complete the Demand Dial Internet configuration, you need to assign the static IP address to this external modem interface as shown below.

1. In the Routing and Remote Access Console, click **Routing Interfaces**. In the panel on the right, right click the demand dial interface (ex. "ToISPRouter") and select **Properties**.
2. Select the **Networking** Tab and click **Internet Protocol (TCP/IP)**. Click **Properties**.



3. Select **Use the following IP address**, type the static IP address provided by your ISP and click **OK** as shown below.

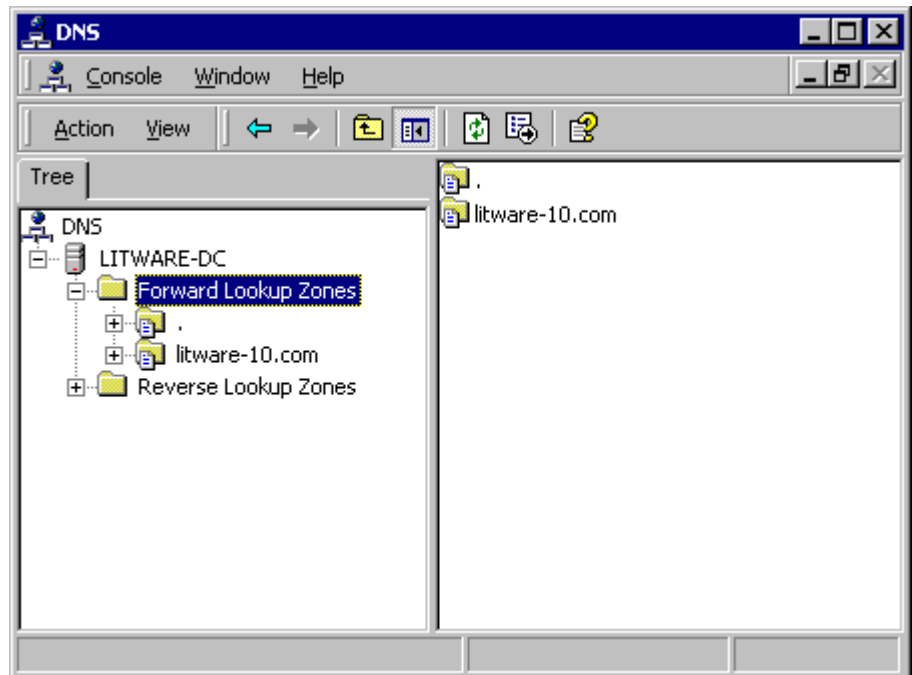


Congratulations. You have now completed configuring demand dial connections to the Internet. Similar to the Dedicated Internet configuration, this server now has a static Internal IP address reserved in the DHCP server and a static External IP address provided by the ISP. We now need to communicate this information to the client machines in the network by configuring the NICs and Modem Interfaces with the appropriate IP addresses.

Updating the local DNS server for Internet naming resolution
Before network clients can access the Internet, the network needs to know how to resolve Internet domain names. For example, if someone types www.msn.com in their Internet browser, the network should know to forward the name to the ISP's DNS server for resolution.

To configure name resolution forwarding to the ISP's DNS server:

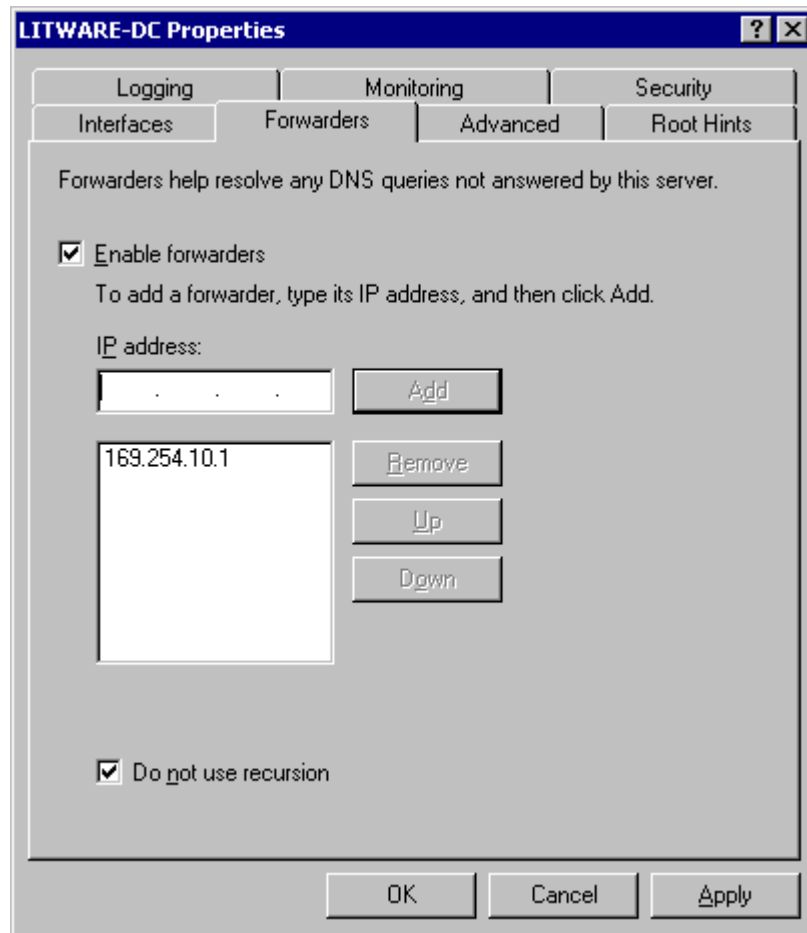
1. Log on to the DNS Server as the Administrator. From the **Start** menu, point to **Programs**, point to **Administrative Tools**, and click **DNS**.
2. Expand the DNS Server so that you see the Forward Lookup Zones and the Reverse Lookup Zones. Expand the Forward Lookup Zones folder.



In standalone networks, the DNS server will automatically assume it has root authority, which means it will assume there are no other DNS servers that have greater authority. To add DNS forwarding, you need to delete the Root DNS zone and add a forwarding DNS Address.

3. Right click the "." folder under the Forward Lookup Zones Folder and click **Delete**. This is the Root DNS zone.
4. Right click the DNS Server name (LITWARE-DC) and click **Refresh**. Right click the DNS Server name again and click **Properties**.

- Click the **Forwarders** tab and check the **Enable forwarders** check box. Enter the IP address of the external DNS server. For this example, we have assumed that the ISP has designated 169.254.10.1 as the IP address of their DNS server as shown below. Click **Do not use recursion** and then click **OK**.



Congratulations. You have now completed the process of updating the local DNS server to forward any Internet naming resolution requests to the external ISP DNS server.

CONCLUSION

Local area network clients now have access to the Internet through the shared Internet connection server. To test this connection, clients should restart their computers and open up an Internet Browser. Clients should now have full access to the Internet.

SUMMARY

This guide describes how to provide medium-sized networks with secure access to the Internet using the routing services of Windows 2000 Server. By configuring a Windows 2000 Server as an Internet connection server and updating the DNS server to resolve Internet naming, companies can quickly add Internet access to their networks. In addition, with NAT technology hiding the internal client IP addresses, customers can rely on safe access to the Internet.

Based on the foundation set by following the procedures in this guide, companies will be able to take advantage of the advanced features of RRAS such as advanced data packet filtering to provide additional security, remote access services to allow users to connect back into the network, and virtual private networking to connect branch offices together over the Internet.

FOR MORE
INFORMATION

For the latest information on Windows 2000 Server, check out our Web site at <http://www.microsoft.com/windows2000> and the Windows 2000/NT Forum at <http://computingcentral.msn.com/topics/windowsnt>.

Windows 2000 Web Site Resources

Exploring Communications & Networking Services

<http://www.microsoft.com/windows2000/guide/server/features/communications.asp>

Windows 2000 Planning and Deployment Guide

<http://www.microsoft.com/windows2000/library/planning/default.asp>

For more information on setting up remote access with Windows 2000, see the “Connecting Remote Users to Your Network” deployment guide.