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## **Technical Brief for Home Networking**

Microsoft® Corporation

Published: November 2007

Version: 1.0

### **Abstract**

This technical brief provides an in-depth look at home networking and how it applies to Windows® Home Server.

To learn more about other aspects of Windows Home Server, see the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=100260) (<http://go.microsoft.com/fwlink/?LinkId=100260>).

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# Home Networking Overview

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When used in combination with your existing home network system, Windows® Home Server helps protect, connect, and organize your files, photo, music, and videos.

## Features and Functionality

The core features of Windows Home Server include:

- **Home Computer Backup and Restore**

Windows Home Server automatically backs up your home computers to the home server and allows you to easily restore the entire computer or an individual file or folder to a previous point in time.
- **Shared Folders**

Your family photos, videos, music, and other important documents are located in one central place. You can create folders by subject or topic, so the whole family can stay organized and up-to-date
- **Home Network Health Monitoring**

Windows Home Server monitors its health status and the status of your computers that are running a Windows Vista® operating system. It notifies you of issues that it finds.
- **Media Sharing**

Your home server is preconfigured with shared folders that can be used to store your media files. The folders are named: Photos, Music, and Videos. These shared folders can be enabled for media streaming from the Windows Home Server Console.
- **Remote Access**

After you have configured a user account in the Windows Home Server Console for remote access, you can use a Web browser from a computer to remotely access your home server and home computers.

## Benefits

Windows Home Server is unique among home networking solutions because it was designed to help solve home networking issues “one household at a time” instead of “one personal computer” at a time. Some of the benefits are:

- **Easy-to-Use User Interface**

Home networks can be hard to setup and difficult to understand. Consumers are often expected to understand an acronym-intensive vocabulary. Windows Home Server attempts to simplify the language and make it easier for people to understand the product.

- **Remote Access to Home Computers**

After you log in to your home server from a computer at a remote location, you can quickly connect to a home computer and run applications as if you were sitting in front of that computer.

- **Xbox 360 Interaction**

You can store your digital media on your home server and then access it from any computer or from an Microsoft® Xbox 360™ in your home.

## Home Networking In Depth

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This section explains how Windows Home Server works within a home network.

### Recommended Home Network Configuration

The following network configuration is recommended to support Windows Home Server:

- A broadband (or high-speed) Internet connection
- A UPnP™ certified router/firewall device
- A computer running Windows Home Server that is connected through a wired Ethernet connection to your router/firewall device
- Home computers that are connected through a wired Ethernet or a wireless connection to your router/firewall device



 **Note**

Most routers only support 10/100 megabit per second (Mbps) wired Ethernet connections. To improve your network performance, you should consider adding a 1 Gigabit (1000 Mbps) network switch to your network. Connect your home computers and home server to the faster switch, and then connect the switch to your broadband router.

 **Important**

Connecting your Windows Home Server to your home network through a wireless connection is not supported. Windows Home Server must be connected through a wired connection to your home network. However, using Windows Home Server with home computers that are connected through a wireless connection is supported.

Windows Home Server uses the UPnP architecture to automatically configure your router, but not all broadband routers properly support the UPnP architecture.

 **Note**

For a list of UPnP certified routers that are also certified for Windows Vista , see the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkID=86665) (http://go.microsoft.com/fwlink/?LinkID=86665).

The Internet Connectivity Evaluation Tool checks your router to see if it supports certain technologies. You can use this tool on a computer that is running a Windows Vista or a Windows XP operating system.

The Internet Connectivity Evaluation Tool is available at the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=100267) (http://go.microsoft.com/fwlink/?LinkId=100267).

## Home Networking Acronyms

While you set up and configure your home network, you will see many acronyms. They may be confusing at first, but this section will help you understand them and how they apply to Windows Home Server.

**IP Address** - Each device on your home network has an Internet Protocol (IP) address assigned to it. IP addresses are usually based on a combination of four number clusters, such as 192.168.1.1. Each device on the Internet also has an IP address so that it can be uniquely identified and other devices can communicate with it.

**Static IP Address** - A fixed IP address that is assigned to a specific device.

**Dynamic IP Address** - An IP address that can change or be assigned to other devices.

**Router/Firewall** - A device on your home network between your broadband modem and the computers and other devices on your home network. Most routers have wireless capabilities, so devices can be directly wired with an Ethernet cable or communicate wirelessly with each other. The wide area network (WAN) connection for the router/firewall is assigned an IP address by your broadband service provider.

### Note

One way to determine the external IP address that your broadband provider assigns to your broadband router is to access the WhatsMyIP.org site from a home computer at the [Microsoft Web site](#) (<http://go.microsoft.com/fwlink/?LinkId=100270>).

**Internet Domain Name** - A friendly name for a device on the internet. For example, the internet domain name for the Web server at Microsoft is [www.microsoft.com](http://www.microsoft.com).

**DNS** (Domain Name System) - DNS was designed so that you can use friendly names (for example, smithfamily.homeserver.com) to connect to devices on the Internet. You do not need to remember IP addresses because there are multiple DNS Server services on the internet that lookup friendly names and translate them to the IP address associated with the name.

 **Note**

In your home network, the address for internet accessible DNS servers (as supplied by your broadband provider) can be set in your router/firewall and inherited by your home computers as part of the Dynamic Host Configuration Protocol (DHCP) Server services provided by your router/firewall device.

**DHCP** (Dynamic Host Configuration Protocol) - This service assigns an IP address to each of the devices that are connected in your home network. Your router/firewall device should be configured as a DHCP server, so that the computers are assigned a unique IP address (for example, 192.168.1.47) on your home network. You can configure the DHCP server settings of your router/firewall from the settings web page of your router.

 **Note**

The devices on your home network should be set to acquire their IP addresses and DNS server settings automatically from your router/firewall.

**NAT** (Network Address Translation) - This service redirects public network communication from the Internet to a private device or computer on your home network. This allows multiple computers or devices on your home network with different private IP addresses to share your broadband Internet connection. Your router/firewall acts as a translator to ensure that incoming requests are routed to the correct device or computer on your home network.

**Subnet** - A portion of a home network that shares a common address component in the IP address. Most home networks consist of only one logical network, so the network and the subnet are represented by the same network address. For example, on most home networks, all devices with an IP address that start with 192.168.1.xxx are part of the same logical network. Most broadband routers assign IP addresses in the 192.168.0.xxx, 192.168.1.xxx, or the 192.168.2.xxx subnets.

 **Important**

By default, Windows Home Server allows connections to the home server only from home computers and devices that are on the same subnet. Ensure that your Windows Home Server is on the same subnet as the computers and devices on your home network.

**Ports** - If you think of an IP address as representing the address of a house, then you can think of a port as one of the doors used to enter or exit that house. For example, port 80 is used to respond to Web requests from a browser and port 25 is used for e-mail communications.

**Port Forwarding** - Your broadband router/firewall device can be configured to forward requests from a specific port number to a computer on your home network. For example, all Web requests from a browser on the Internet to port 80 could be forwarded to the internal IP address (for example, 192.168.1.7) of your home server.

**Dynamic DNS** - Most broadband providers provide customers with a dynamic Internet IP address for the WAN connection on your broadband router. This means that your Internet address can be changed periodically by your broadband provider. Dynamic DNS (DDNS) is a system that allows Internet domain names to be associated with a dynamic IP address. Windows Home Server has built-in software that allows you to choose a friendly Internet domain name for your home network. Even if your Internet IP address changes, you can still connect to your home network with your personalized Internet domain name (for example, smithfamily.homeserver.com). DDNS ensures that your new Internet IP address is associated with your Internet domain name.

**UPnP** - UPnP architecture supports automatic discovery of devices on your home network, and it is used by Windows Home Server to configure the port forwarding settings on your router/firewall device for remote access. Many router/firewall devices come with UPnP capabilities, and they can be automatically configured by your home server.

If you enable Media Sharing on your home server through the Windows Home Server Console, your home server will advertise itself on your home network so that other devices can automatically connect to it. From your home network, you can browse to the Windows Home Server UPnP device Web site by using the following address:  
<http://<servername>/upnp/welcome.aspx?>

## Windows Home Server Port Reference

A list of ports that Windows Home Server uses within your home network is provided below.

### Ports Used by Windows Home Server Connector

The Windows Home Server Connector software uses several ports on your home computers to connect and communicate with Windows Home Server. When you initially install the Windows Home Server Connector software, your home computer receives a certificate from the home server and the communications between the home computer and the home server are encrypted.

The ports that are used by Windows Home Server Connector include:

| Service or Protocol                   | Ports     | Scope  |
|---------------------------------------|-----------|--------|
| HTTP                                  | TCP 55000 | Subnet |
| HTTPS                                 | TCP 56000 | Subnet |
| Windows Home Server Computer Backup   | TCP 8912  | Subnet |
| Windows Home Server Transport Service | TCP 1138  | Subnet |

 **Note**

Some firewall programs may block these ports, and this could cause your Windows Home Server Connector software installation to fail. If you have issues installing the Windows Home Server Connector software, you should check your firewall software documentation to learn how to unblock those ports.

## Ports Used for Media Sharing on Your Home Network

To enable Media Sharing on your home server, open the Windows Home Server Console, click **Settings**, and then click **Media Sharing**.

Windows Home Server Media Streaming uses the following ports:

| Service or Protocol   | Ports           | Scope  |
|-----------------------|-----------------|--------|
| UPnP Framework        | TCP 2869        | Subnet |
|                       | UDP 1900        | Subnet |
| Windows Media Connect | UDP 10280-10284 | Subnet |
|                       | TCP 10243       | Subnet |

### Important

When you enable Media Sharing, Windows Media Connect bypasses all user accounts and allows for streaming to any device that supports Windows Media Connect. You should make sure that your home network is secure by enabling wireless security and setting strong passwords on your Windows Home Server and home computers.

## Ports Used for Remote Access

By default, remote access is disabled for your home server. To enable remote access, open the Windows Home Server Console, click **Settings**, and then click **Remote Access**.

Windows Home Server Remote Access uses the following ports on your home server to enable you to access your home server while away from home:

| Service or Protocol  | Ports    | Scope        |
|----------------------|----------|--------------|
| HTTP Web requests    | TCP 80   | Any computer |
| HTTPS Web requests   | TCP 443  | Any computer |
| Remote desktop proxy | TCP 4125 | Any computer |
| Remote Desktop       | TCP 3389 | Subnet       |

Windows Home Server uses a remote desktop proxy—the home server receives requests on port 4125 and communicates with the home computers using port 3389.

Windows Home Server uses UPnP protocols to configure your broadband router to forward these ports from your broadband router to your home server. Any Web request that is sent to your broadband router using these ports is forwarded directly to your home server. To configure your router, open the Windows Home Server Console, click **Settings**, and then click **Remote Access**.

 **Note**

If your router can not be configured by your home server, then you need to manually forward the TCP ports 80, 443, and 4125 from your router to the IP address of your home server. For more information, see the documentation for your broadband router or visit the [Port Forward Web Site](http://go.microsoft.com/fwlink/?LinkId=100269) (<http://go.microsoft.com/fwlink/?LinkId=100269>).

 **Important**

You do not need to forward TCP port 3389 from your router to your home server. For more information, see the Technical Brief on Windows Home Server Remote Access at the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=103939) (<http://go.microsoft.com/fwlink/?LinkId=103939>).

 **Caution**

Do not reset the defaults of the Windows Firewall from the Administrator's desktop. If you do this, you will need to manually reconfigure the port exceptions that are used by Windows Firewall for Windows Home Server. For more information, see Troubleshooting Windows Home Server Connector Installation document on the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=103940) (<http://go.microsoft.com/fwlink/?LinkId=103940>).

## More Information

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For more information about Windows Home Server, see:

- The [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=100260) (http://go.microsoft.com/fwlink/?LinkId=100260).
- The Windows Community Forums at the [Microsoft Web site](http://go.microsoft.com/fwlink/?LinkId=100263) (http://go.microsoft.com/fwlink/?LinkId=100263).