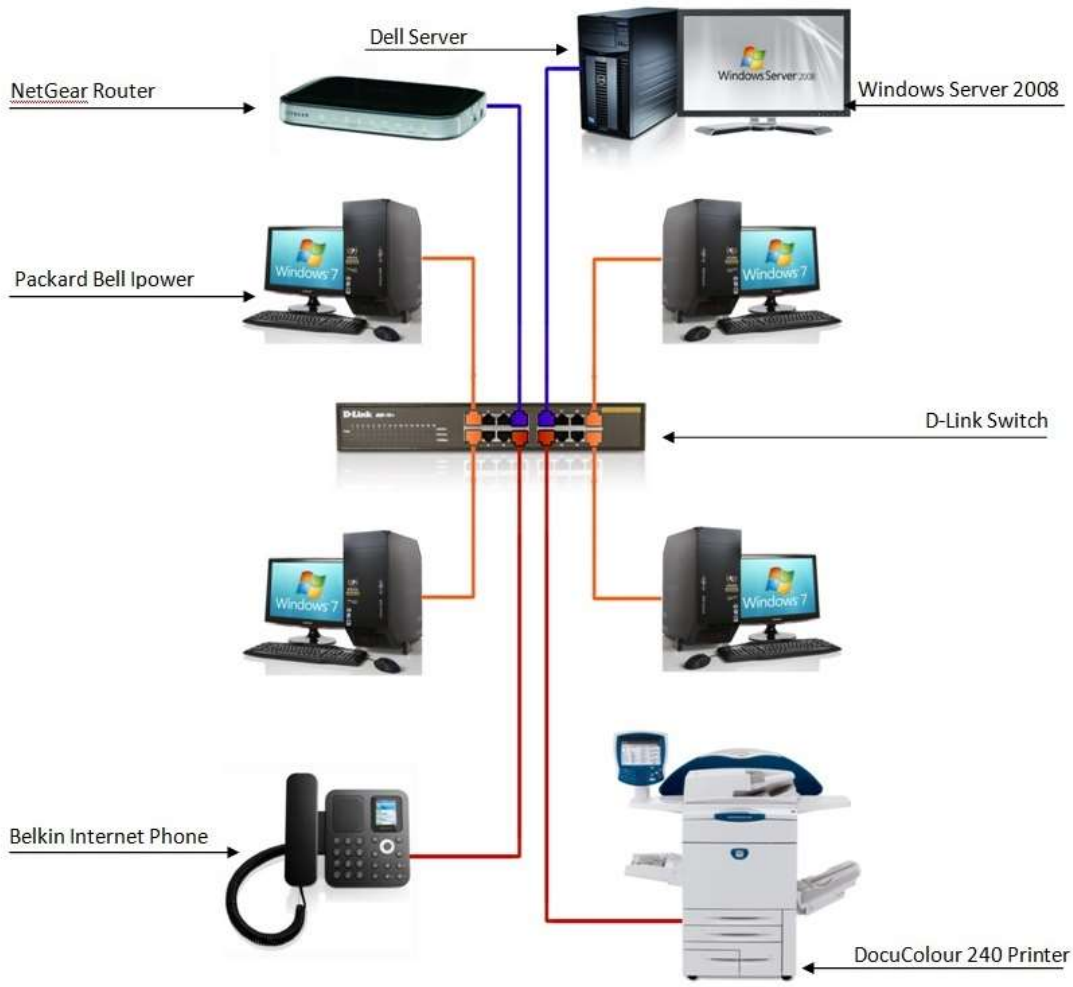
Setup and Configure a Local Network

By Jeffrey Farnan



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1. Introduction

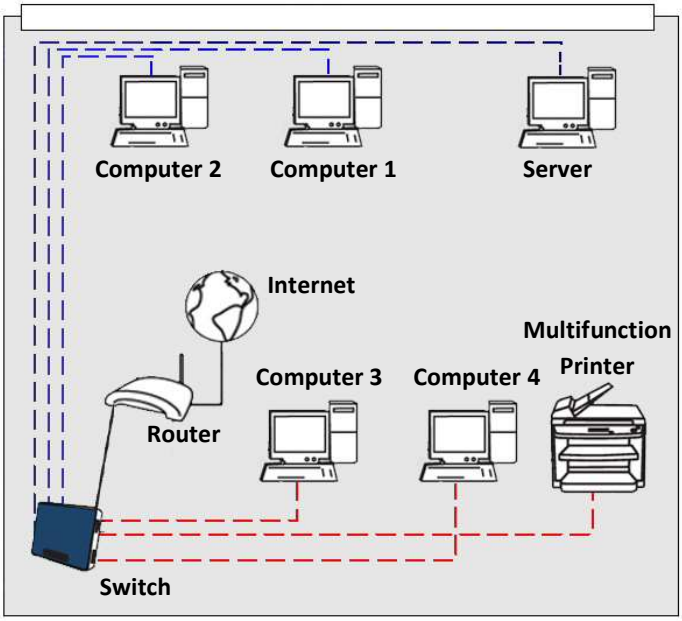
Setting up and configuring a local network can become very technical very quickly it is usually a good idea to plan ahead before you start. This is a networking plan for a small Computer Game Development company outlining its setup and configuring a local network suitable for this type of business. Building a network from scratch means planning, network diagrams, selecting the correct hardware for the business, installing software, what type of network is suitable, configuring the network and making sure they work correctly. Other considerations are making sure the network runs efficiently, maintained and made secure.

2. The office Layout

The office building lies in a large Industrial Estate, on the outskirts of the city centre. This Industrial Estate is home to many national and international computer companies and is nicknamed "Ireland's Silicone Valley". The main reasons for choosing this Estate was because we have access to high speed broadband and many of the game developers we hope to do business with have premises at this location. The building itself is at the heart of this Industrial Estate, where it was recently redeveloped and turned into office units. As a start-up company this office space was perfect for us, with the downturn in the economy we were able to rent a single room, at a cheaper rate than in previous years. We choose this room because of its large space, clear windows and wooden floors . The room was already fitted out with lights, electrics and phone sockets. An extra added bonus for us was the building had a canteen, toilets and a conference room available whenever we wanted.

The Fit-Out

We got all the office furniture from a local furniture suppliers. An Electrical contractor fitted out the office supplying and installing the cables, plastic covering for cables, sockets, the switch and the switch box. We bought 4 Packard Bell ipower Gaming PC's and an extra monitor each, direct from Packard Bell. The Server and a single monitor from dell, and the printer from DocuColor were all ordered online.



Planning Phase of I.T Layout

The first thing I did was sit down and draw up a list of all the equipment what we would need, and design a rough layout of where everything in the office was going to be placed. This layout would help the contractors who would be doing the wiring.

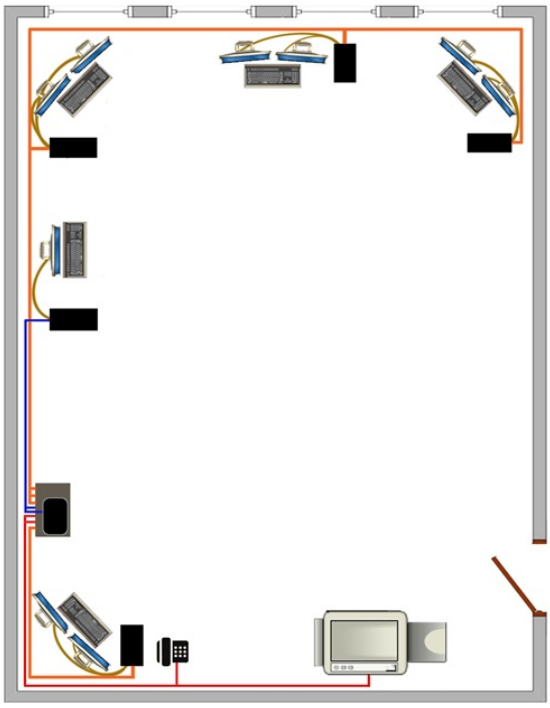
Setting up the I.T system

When the contractor's had finished doing the wiring and installed the switch in the switch box, and all the furniture had been put in place, the next job was to order the server, computers and software packages off the Internet (The next sections will cover these in detail).

When all the equipment arrived, it was just a matter of unpacking everything and placing the computers on the desks. We decided to change things around a bit, and not keep to the office layout we had done, since we had so much room and since there were so many sockets we could put the computers anywhere we liked. The three programmers would be at the bottom of the room and me, the network administrator in the middle.

Office Layout

Our open plan office is very modern and spacious environment. As you walk in the door to your left, there is the printer so employees can grab their printed material as they walk in and out. The lead programmer has his own desk and has the only phone, which is an internet phone. He has dual monitors and all computers are underneath each desk. Above his head to his right is the switch box this contains the switch and router. Next to the switch box is another set of cabinets, and next to that is my desk, the Network Administrator, having a single monitor. There are two employees in each of the bottom corners and one in the middle, these employees are programmers and they also have duel monitors.



The Physical Network

The physical network is easy to understand because it's usually visible. Mainly, it consists of hardware: computers, main servers, switches, the wiring, plugs such as computer ports, printers, routers and other devices that process data.

The Physical Components of our network

Here is a list of our network components that we ordered off the Internet and which we had delivered to us.

The Server

Dell PowerEdge T310 Server

The Computers

Packard Bell ipower x2.0 gaming PC

The Switch

D-LINK 16-Port Switch

The Router

NetGear Router

The Phone

Belkin Internet Phone

The Printer

DocuColor 240 Printer

System Software

System software controls the hardware components, such as the mouse, the keyboard, and computer memory. It ensures that the instructions received from a user are correctly interpreted. System software consists of an operating system and basic utility software such as device drivers.

A device driver is software that helps a device, such as a printer, communicate with the operating system. As a user, you need to be sure you have up-to-date drivers. When a new computer is purchased and the operating system is already loaded, the drivers should be all set to go.

Operating System

An operating system is software the carries out the basic function of a computer. The operating system provides an environment for hardware and software to work together. Operating systems have a graphical user interface (GUI). With a GUI, you use icons (small pictures) or minus to perform a function or run a program.

Common descriptions of operating systems capabilities include the following;

- -Multitasking (simultaneously running multiple programs)
- -Multiprocessing(running a program on multiple CPUs, thereby increasing the processing speed)
- -Multi-user(simultaneously running the same program for multiple users)
- -Built-in support for graphics
- -Built-in support for networks

The Network Operating System

A network server must have an operating system to function, usually called a (NOS) Network Operating System, the differences between a desktop operating system and a Network Operating System are scale and resources. NOS's are optimized differently than desktop operating systems, they have to provide the best possible performance to all users accessing the server rather than giving priority to any one of them.

Prominent features of NOS's are

- Support port interfaces for Ethernet and other protocols
- Manage traffic coming into and out of the machine
- Provide authentication, authorization, and logon filters
- Furnish name and directory services
- Support file, print, web services, and backup mechanism for data

This section will look at the Operating Systems, **Windows 10** and **Windows Server 2008 R2** that came already installed on the computers.

Windows 10 is the latest public release version of Microsoft Windows, a series of operating systems produced by Microsoft for use on personal computers, including home and business desktops, laptops, netbooks, tablet PCs, and media center PCs. Windows 7 was released to manufacturing on July 22, 2009, and reached general retail availability on October 22, 2009, less than three years after the release of its predecessor, Windows Vista. Windows 7's server counterpart, Windows Server 2008 R2, was released at the same time.

Unlike its predecessor, which introduced a large number of new features, Windows 7 was intended to be a more focused, incremental upgrade to the Windows line, with the goal of being fully compatible with applications and hardware with which Windows Vista is already compatible Presentations given by Microsoft in 2008 focused on multi-touch support, a redesigned Windows Shell with a new taskbar, referred to as the Superbar, a home networking system called HomeGroup, and performance improvements. Some applications that have been included with prior releases of Microsoft Windows, including Windows Calendar, Windows Mail, Windows Movie Maker, and Windows Photo Gallery, are not included in Windows 10; most are instead offered separately as part of the free Windows Live Essentials suite.[

Windows 10 includes a number of new features, such as advances in touch and handwriting recognition, support for virtual hard disks, improved performance on multi-core processors, improved boot performance, DirectAccess, and kernel improvements.

Windows 10 adds support for systems using multiple heterogeneous graphics cards from different vendors (Heterogeneous Multi-adapter), a new version of Windows Media Center, a Gadget for Windows Media Center, improved media features, the XPS Essentials Pack and Windows PowerShell being included, and a redesigned Calculator with multiline capabilities including *Programmer* and *Statistics* modes along with unit conversion. Many new items have been added to the Control Panel, including ClearType Text Tuner, Display Color Calibration Wizard, Gadgets, Recovery, Troubleshooting, Workspaces Center, Location and Other Sensors, and much much more.

Windows Server 2008

Windows Server 2008 R2 builds on the award-winning foundation of Windows Server 2008, expanding existing technology and adding new features to enable organizations to increase the reliability and flexibility of their server infrastructures. New virtualization tools, Web resources, management enhancements, and exciting Windows 7 integration help save time, reduce costs, and provide a platform for a dynamic and efficiently managed data center. Powerful tools such as Internet Information Services (IIS) version 7.5, updated Server Manager and Hyper-V platforms and Windows PowerShell version 2.0 combine to give customers greater control, increased efficiency, and the ability to react to front-line business needs faster than ever before.

What is Windows Server 2008 R2?

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What's New in Windows Server 2008 R2

Windows Server 2008 R2 delivers valuable new functionality and powerful improvements to the core Windows Server operating system to help organizations of all sizes increase control, availability, and flexibility for their changing business needs. New Web tools, virtualization technologies, scalability enhancements, and management utilities help save time, reduce costs, and provide a solid foundation for your information technology (IT) infrastructure.

Windows Server 2008 R2 has five core pillars which provide updates to existing functionality and new features.

Web Application Platform

Windows Server 2008 R2 includes many enhancements that make this release the most robust Windows Server Web application platform yet. It offers an updated Web server role, Internet Information Services (IIS) 7.5, and greater support for .NET on Server Core.

Scalability and Reliability

Windows Server 2008 R2 is capable of unprecedented workload size, dynamic scalability, and across-the-board availability and reliability. A host of new and updated features will be available, including leveraging sophisticated CPU architectures, increased operating system componentization, and improved performance and scalability for applications and services.

Management

The ongoing management of servers in the data center is one of the most time-consuming tasks facing IT professionals today. Any management strategy you deploy must support the management of both your physical and virtual environments. To help with this problem, Windows Server 2008 R2 has new features to reduce the ongoing management of Windows Server 2008 R2 and to reduce the administrative effort for common day-to-day operational tasks.

Virtualization

Virtualization is a major part of today's data centers. The operating efficiencies offered by virtualization allow organizations to dramatically reduce operational effort and power consumption. Windows Server 2008 R2 provides the following virtualization types: Client and Server virtualization provided by Hyper-V and Presentation virtualization with Remote Desktop Services.

What is virtualization and why use it

Virtualization is a method of running multiple independent virtual operating systems on a single physical computer. Virtualization technology is a way of achieving higher server density it is a way of maximizing physical resources to maximize the investment in hardware. This slashes the majority of hardware acquisition and maintenance costs that can result in significant savings for any company or organization.

The Virtual Servers we will be using:

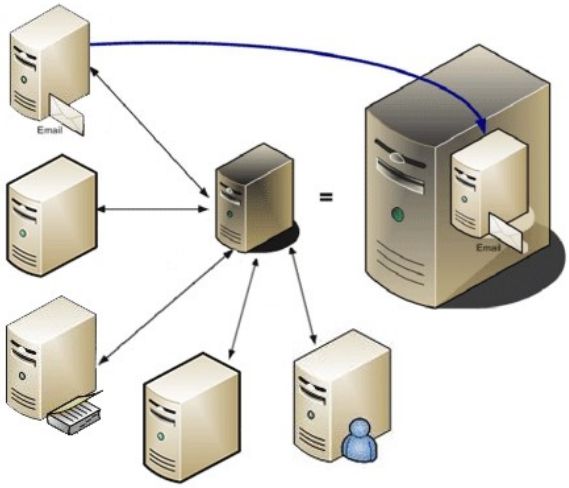
Communication serv

File server –

Application server –

Print server –

Domain controller –



Communication server – A communication server provides a communication platform for the network. For example, Microsoft Exchange supplies and email, calendar, and contracts platform allowing users to communicate and share appointments, address book, and meeting information. Other examples of communication server software include Lotus Notes and Novell GroupWise.

File server – A file server's job is to provide a central location for the company's data. The network administrator can assign different levels of access to each file contained on the file server. Some users can have full access (meaning that they can delete files on the file server), whereas other users might only be able to access a file or files in a read-only mode (meaning that they can't edit the file).

Application server – An application server hosts applications, including specialized data associated with an application. Application servers provide the backend processing power to run complex databases and other applications. User computers require a client application to access the services that the application server provides. Microsoft SQL server and Oracle are two examples of client/server database environments.

Print server – A print server hosts a printer or printers on the network. It not only allows the network administrator to control print jobs, but it also provides the memory and hard drive space to spool print jobs in the print queue as each print job waits to be printed.

Domain controller – On Windows Server Systems, a domain controller (DC) is a server that responds to security authentication requests (logging in, checking permissions, etc.) within the Windows Server domain. A domain is a concept whereby a user may be granted access to a number of computer resources with the use of a single username and password combination.

INTERNET SOFTWARE

The Internet has changed the way the world communicates. In corporate environments, email and the World Wide Web have become as indispensable as the telephone. The Internet also reaches into homes, schools, libraries, government offices, hospitals, and just about every other kind of organization where communication is an important activity. The two most important pieces of software for Internet users are email programs and Web browsers.

A *Web browser* is a program that provides a graphical view of the World Wide Web. Web give you access to Web sites, which are composed of Web pages. A Web page might contain text, graphics, animations, sounds, movies, and other interactive elements. A Web browser makes is easy to navigate or "surf" the Web, download items print Web pages, and mark your favourite pages for easy access.

E-mail programs allow you to send messages and file attachments to anyone who has an email address. Some email programs are standalone applications, while others come bundled with a companion Web browser.

Internet Explorer 7

Internet Explorer is the most common Web browser, and the version included with windows 7 is Internet Explorer 7. Internet Explorer is installed automatically when you install Windows 7 on your computer.

Before you can use Internet Explorer to browse the Web, you must be connected to the Internet. When you are connected to the Internet, you are online. Going online might require only turning on your computer and logging onto you internal network. Many networks automatically connect you to the Internet

Email

Email communication has the advantage of enabling written messages to be passed speedily between individuals and around organisational networks, and for responses to be returned just as quickly. You create your correspondence or email, place an "address" on it, and then send it on its way. Your network email system takes care of the return address and router your email across your local network and the internet. If it gets there, great, if not, it will provide you a notification that the message was undeliverable.

A wide variety of email clients and servers are available. Most of them now centre around two Internet standards: POP3 (Post Office Protocol version 3) and IMAP4(Internet Message Access Protocol version 4). Most email servers support both protocols, but POP3 is more common.

Skype is an application that turns a personal computer into a telephone. Skype uses voice over Internet protocol (VoIP) technology, which converts voice signals into data streams that are sent over the Internet and converted back to audio by the recipient's computer. Although Skype is not the only company that offers VoIP services for consumers, it functions on a P2P model rather than as a centralized application. With the P2P model, users download a piece of software that allows computers to communicate directly with one another, without having to be routed through a central location. This decentralized model allows Skype to function as a robust, distributed medium for communication. The service allows communication

between Skype-equipped devices, which is free, or between Skype device and a conventional telephone for relatively modest fees. Skype offers features such as voicemail and call forwarding, and the service also now supports video communication.

How does it work?

Users download a free application, creating a distributed network of computers running the service. Each machine in the network shares the duties of processing and distributing data. The Skype application does not need to be installed on a computer, however. It can run from a USB flash drive, allowing users to plug a flash drive into any Internet-connected computer and

immediately have access to the service. With USB handsets, users can talk on Skype using a conventional phone device, and Skype-equipped Wi-Fi phones let users tap into the Skype service anywhere they have Wi-Fi access, without needing to have a computer. Because it does not depend on a central server, Skype is available as long as individual nodes are working. Skype offers a searchable directory of Skype users, as well as features including conference calling, file transfer, chat, and alerts.

Beyond the free Skype-to-Skype calls, users can pay for premium services such as SkypeOut and SkypeIn. SkypeOut lets users call any regular phone from a Skype-equipped computer. Customers who use SkypeOut either pay for a package that provides unlimited calls within a geographic area, such as within the United States and Canada, or they pay per-minute charges that in most cases are considerably less than comparable charges from phone carriers. With SkypeIn, users pay for a conventional phone number that anyone with a regular phone can use to call the Skype user. Skype also ties in with a number of other applications, such as MySpace and eBay (which bought Skype in 2005). Users of eBay can set Skype alerts that notify them when someone bids on their items or when someone outbids them in an auction, and they can communicate through Skype with other eBay buyers and sellers. MySpace users can add Skype tools to their profile page and use them to connect with one another.

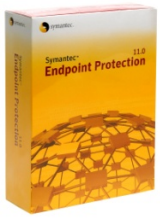
Internet Security

Internet security has become a serious issue for anyone connected to the net. Having a secure computer helps guard against hackers and other unwanted guests. These days as Broadband becomes more accessible to with both technology and costs it means that the unwanted visitors also have these options. If someone gains access to your computer, it can be used as a "zombie" for hacking into other computer, hiding the trail of the person who is actually doing it. Even if your computer isn't used for anything critical you need to run security software such as an antivirus and a firewall. These programs will keep your computer "hidden" from prying eyes over the internet, as well as protected from viruses and other malware that can be spread through email or other methods. You also need to make sure you're familiar with the different types of security threats so you can deal with them if they ever come up.

Internet security is a fairly broad term, covering quite a few different areas. In reality, each of these areas needs a particular type of software to keep you protected. Some internet security suites - like Symantec Security for example - include many or all of these.

Symantec™ Endpoint Protection

The next generation of antivirus technology from Symantec



About Symantec

Symantec is a global leader in providing security; storage and systems management solutions to help consumers and organizations secure and manage their information-driven world. Our software and services protect against more risks at more points, more completely and efficiently, enabling confidence wherever information is used or stored.

Symantec Endpoint Protection provides the following:

- **Antivirus and Antispyware:** Antivirus and Antispyware scan for viruses and for other security risks, including spyware, adware, and other files that can put a computer or a network at risk.
- **Personal Firewall:** The Symantec Endpoint Protection firewall provides a barrier between the computer and the Internet, preventing unauthorized users from accessing the computers and networks. It detects possible hacker attacks, protects personal information, and eliminates unwanted sources of network traffic.
- **Intrusion Prevention:** The intrusion prevention system (IPS) is the Symantec Endpoint Protection client's second layer of defense after the firewall. The intrusion prevention system is a network-based system. If a known attack is detected, one or more intrusion prevention technologies can automatically block it.
- **Proactive Threat Scanning:** Proactive threat scanning uses heuristics to detect unknown threats. Heuristic process scanning analyzes the behavior of an application or process to determine if it exhibits characteristics of threats, such as Trojan horses, worms, or key loggers. This type of protection is sometimes referred to as zero-day protection.
- **Device and Application Control:** Device-level control is implemented using rule sets that block or allow access from devices, such as USB, infrared, FireWire, SCSI, serial ports, and parallel ports. Application-level control is implemented using rule sets that block or allow applications that try to access system resources.
- **Kernel-level rootkit protection:** Symantec Endpoint Protections expands rootkit protection, to detect and repair kernel-level rootkits. Rootkits are programs that hide from a computer's operating system and can be used for malicious purposes.
- **Role-based administration:** Allows different administrators to access different levels of the management system based on their roles and responsibilities.

- **Group Update Provider:** Symantec Endpoint Protection clients can be configured to provide signature and content updates to clients in a group. When clients are configured this way, they are called Group Update Providers. Group Update Providers do not have to be in the group or groups that they update.

- **Location awareness:** Symantec Endpoint Protection expands location awareness support to the group level. Each group can be divided into multiple locations, and, when a client is in that location, policies can be applied to that location.

- **Policy Based settings:** Policies control most client settings, and can be applied down to the location level.

- **Enhanced LiveUpdate:** LiveUpdate now supports the downloading and installation of a wide variety of content, including definitions, signatures, white lists to prevent false positives, engines, and product updates

Connecting Components

This section will look at connecting the different components of our system from the dual monitors to network cables.

Dual Monitors

If you're using an operating system that supports multiple monitors, such as window 7, you can use two or more monitors simultaneously. This arrangement is useful when you're working with large spreadsheets, multiple interrelated documents, and other large documents. To use multiple monitors, you need two monitors, two video cables, and either two video adapters or one video adapter with two ports.

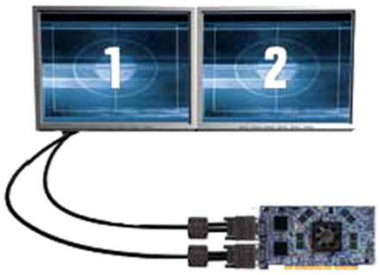
Multiple Monitor compatible desktop

Desktops normally have one port to connect to display device / monitor. Extra ports for extra monitors can be added by adding a Video Adapter Card (or Graphics Card as its sometimes called). In order to connect extra adapter cards, you would need compatible and available expansion slots in your desktop's motherboard. PCI Express is a quite popular type of expansion slot which can accommodate a multiple monitor Video Adapter Card.

Multiple Monitor Adapter Card

There are many adapter cards available for connecting multiple monitors and the cost of multiple monitor adapter cards vary a lot depending on many factors. Few of the factors which decide the cost of the adapter card include number of available output ports, inbuilt memory, brand, etc. Adapter cards can broadly be seen as a combination of two brands. The first part is the processor, companies such as NVIDIA, Matrox, ATI etc produce these processors. The second part is the other parts of the adapter card, companies such as Micro Star International etc manufacture graphics cards by taking processors (NVIDIA, ATI Radeon etc). For example NVIDIA created a multi monitor processor NVS 450 and HP took that processor and created the actual adapter card. It might be easy to look for a adapter card by looking with the processor name such as NVS 450 (from NVIDIA), etc

Installing the Video Adapter Card

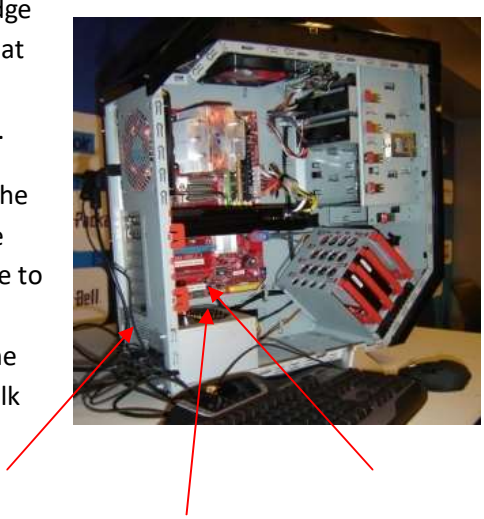


Shut off the computer's power and disconnect the power cord. Take the adapter card out of its packaging and examine it

After you figure out what card type you're working with (again we are talking plug-and-play), open the computer, the cover should easily snap off.

Select the slot where you want to install the card and remove the slot cover- a small piece of sheet metal that covers the slot in the back of the computer when no card is installed. The slot cover is held in with a 1/4-inch or 5/16-inch screw that often has a Philips slot as well. Save the screw after you've removed the slot cover – you'll need it to fasten the card when you're done.

Install the card. Then take it and line it up with the slot. Ensure that the sheet-metal piece that resembles the slot cover faces the outside of the computer. After the card is lined up in the slot, gently but firmly press it into the slot. You might have to gently rock the card back and forth. When the card is fully seated in the slot, most of the connections on the bottom edge will be hidden inside of the connector, and the part of the card that screws in will be level against the back of the computer's chassis. Screw the card in using the slot cover screw you removed earlier.



Finish up. Replace the case cover on the computer. Then plug in the power cord and restart the computer. You'll have to install device driver software (used to enable adapter cards and other hardware to interact with the OS) to make it work, using the manufacturer's directions to do so. The Video Adapter Card is plug-and-play so the OS should recognize the new device upon start-up and should walk you through the process of selecting the best driver for the hardware.

Expansion Slot Cover

Expansion Slot

Video Adapter Card

Setting up dual monitors

When you connect an external display device – which could be a projector, another monitor, or even a television-sized or LCD monitor – to your computer, windows 7 opens a New Display Detected dialog box. You can use this dialog box to configure the second display with one of the following settings:

Mirrored – Duplicates what's on your primary monitor. Use this setting when you want people to see exactly what you're doing on your computer.

Extended – Increases the size of your desktop, giving you more "real estate" to work with. Use this setting when you want the second monitor to give you more space to work with multiple programs and folder windows at the same time.

External Display Only – Displays your desktop and your computer's output on only the external monitor. Use this setting if you want to play a video file or DVD on a large monitor for a group to see, or if you can present information on the external device without having to work closely on the computer, such as when you present a slideshow

In addition to the settings above, the display settings in the New Display Detected dialog box include resolution, colour depth and refresh rate.

You can also use the Display Settings dialog box, which you open from the Control Panel, to configure multiple display devices.

Network wiring

The computers in the network need a pathway to connect to each other. This pathway can be a physical connection of one type of wire or cabling or another. Wiring is the heart of a network. It's also the part most vulnerable to performance problems caused by poor installation practices. No network is better than the quality of the wiring on which it runs.

Cables

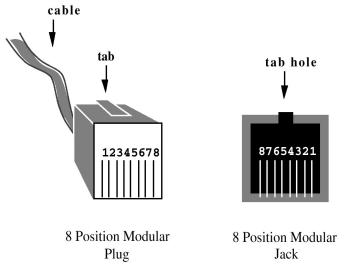
Twisted- pair connectors

UTP cabling uses four types of connectors: RJ-11, RJ-14,RJ-25 and RJ-45. The "RJ" in the jack's designation simply means "registered jack," and the number refers to the specific wiring pattern used for jacks and connectors. Usually, RJ-11, RJ-14, and RJ-25 connectors are used for telephone and dial-up modems connections. Twisted-pair networks cables use RJ-45 connectors, which look a lot like the other RJ snap-in connectors except that they're large. RJ-45 connectors are what you'll see most commonly on a wired network. RJ-45 and RJ-11 are shown in Exhibit 1.

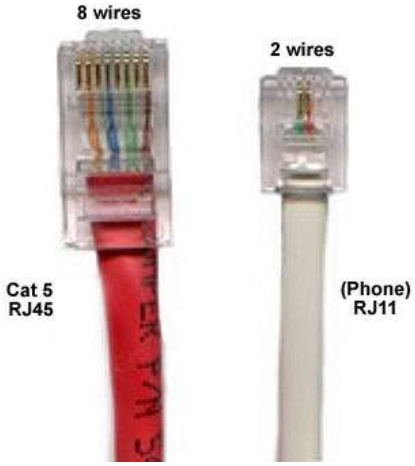
RJ-11 and RJ-45 Connectors

RJ-11 is the connector that hooks your telephone to the telephone jack. It support up to two wires though most phone lines use only one pair. The other pair is used to support a second phone line. RJ-11 connectors are primarily used for dial-up networking and are not used in any common LAN installation, although a few weird and not used in any common LAN installation, although a few weird “network in a box” – type companies used them. RJ-45 is the standard for UTP connectors. RJ-45 has connections for up to four pairs and is visibly much wider than RJ-11.

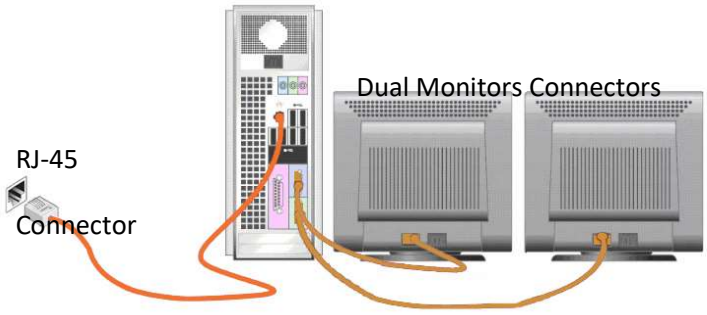
This diagram shows the position of the *1 and *8 pins on an RJ-45 jack. Like all wires, the wires in UTP are numbered. However, a number does not appear on each wire. Instead, each wire has a standardized colour.

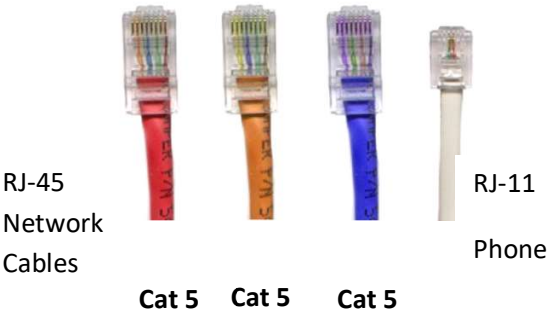


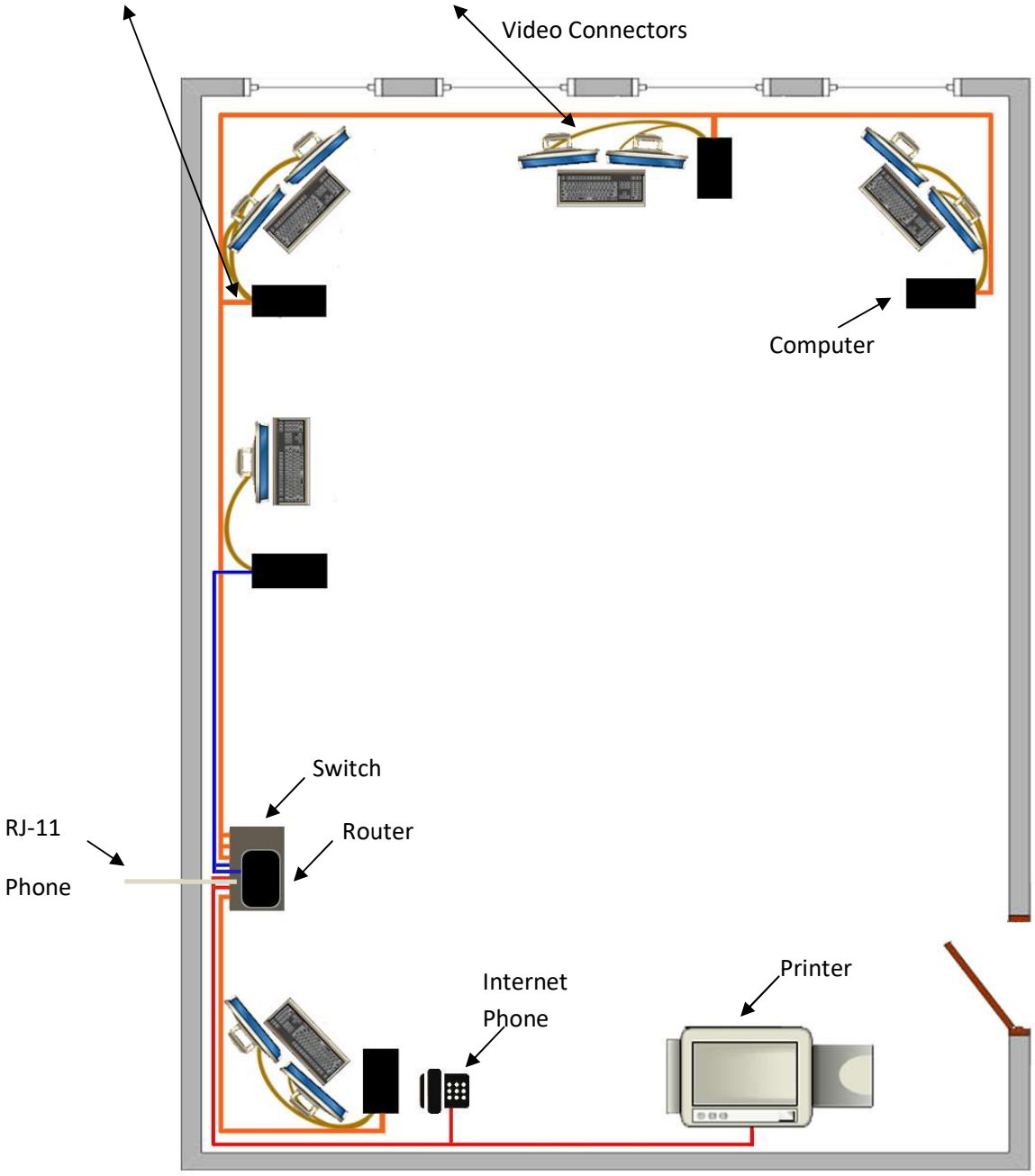
Most networks now use at least Cat5 cable, which operates at up to 100 Mbps, Cat 5 cables have 20 twists per foot.



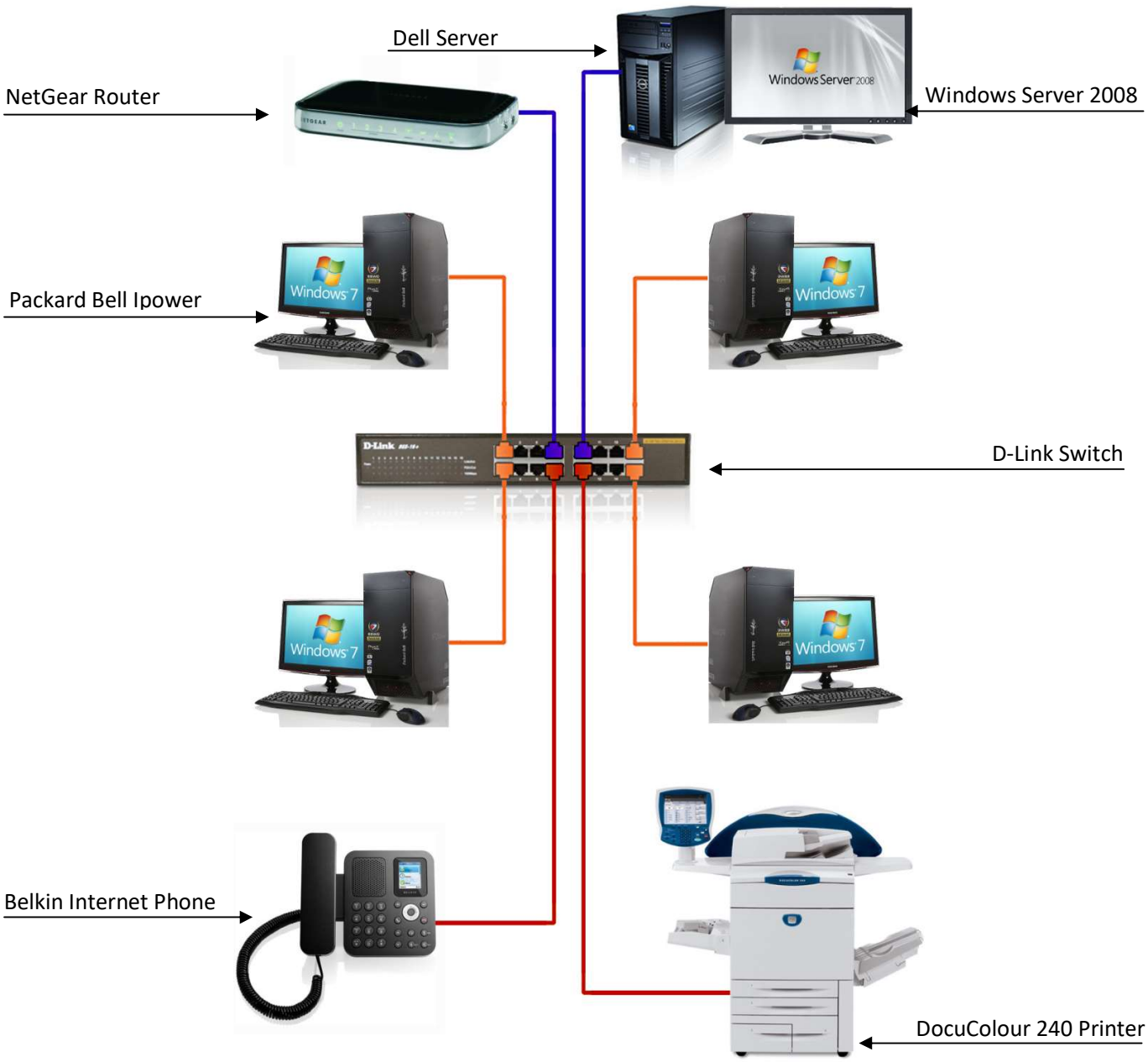
Cable Layout







Network Layout



Configuring the Server

Once the physical network is connected it is now time to configure the Server to activate the network. Windows Server 2008 R2 came already installed on the Dell PowerEdge T310 Server. Most of the settings were set to the default settings which are quite easy to change, I have to configure these settings for the particular roles and services to set up a network. Before I get to change these settings, I have to mention how computers communicate with each other.

Network protocols

If two computers are required to communicate over your network, they must be configured with the same network protocol. Network protocols are the languages that computers, servers, and network devices use to communicate with each other. Protocols send data across the network in units called packets. TCP/IP is the standard in terms of networking protocols.

TCP/IP

(Transmission Control Protocol/ Internet Protocol) A routable, non-proprietary protocol that's the predominant Windows network protocol. TCP/IP is also the protocol of the Internet. The Microsoft NOS (Server 2008 RS) and Microsoft client (Windows 7) are configured for TCP/IP by default.

IP addresses and Subnet Masks

Every device on a network must have a unique IP address. Computers find and talk to each other by using IP addresses (Internet Protocol addresses). These comprise four sets of numbers, from 0 to 254, separated by dots (periods). For instance, the following are possible IP addresses:

207 .46.198.30
70.96.117.67

A computer's IP address is either entered manually or is obtained automatically from a DHCP server that's dedicated to passing out addresses in a given range. I will set up a DHCP server what will assign IP addresses to all the devices on my network. I will also mention how to enter an IP address manually. I have to configure Windows 2008 and set up a domain controller so the server can recognise the devices on the network.

IP addressed don't mean anything without an accompanying subset mask. Devices on a network need to be capable of telling what part of the IP address is providing information related to which network the computer with a particular address in on. The subnet mask determines this information.

Configuring a Windows 2008 Server

Configuring a Windows 2008 server as a domain controller, file server or to provide other services, such as remote access, Domain Name System (DNS), or Dynamic Host Configuration Protocol (DHCP) is straightforward. Windows Server 2008 provides the *Manage Your Server* window (it opens the first time the NOS is run), which can helps add, remove, and manage all the server's different roles.

I want to make the server a domain controller (which is necessary to create a new root domain for the network), I select the *Add link* in the *Manage Your Server* window. This starts the *Configure Your Server Wizard*, which lists all the possible roles for a server, such as file server, print server, domain controller, and DNS server.

To add a role, all I to do is select the role in the *Configure Your Server Wizard* window and click next. In the case of making a server a domain controller, the *Configure the Server Wizard* walks me through the steps of making the server a domain controller. During the process, I have to supply a full DNS domain name for the root domain I am creating.

Naming Our Domain

I named our Domain: **Troodon.local.** By using the extension ".local" at the end of the Active Directory domain name, ensures that the Internal domain remains separate from the Internet domain. If a service, such a DNS or DHCP, is not available on the network, the wizard can configure the server to provide that type of service. After the process is complete, the new role (in this case, domain controller) is added to the *Manage Your Server* Window, making it easy to manage a particular role. After I added the domain controller role, I can quickly start the different Active Directory tools, such as the Active Directory Users and Computers snap-in, directly from the *Manage Your Server* window. The Active Directory Users and Computer snap-in is used to manage Active Directory objects such as users, groups and computers.

Domain Controller

When you install Windows Server 2008 Server on a computer, you can choose to configure a specific server role for that computer. When you want to create a new forest, a new domain, or an additional domain controller in an existing domain, you configure the server with the role of domain controller by installing Active Directory.

DNS (Domain Name Service)

Knowing that users were not going to be able to remember lots of IP addresses, early Internet pioneers came up with a way to correlate those numbers with more human-friendly computer designations. Special computers, called domain name service (DNS) servers, keep databases of IP addresses and their corresponding names. For example, a machine called TOTALSEMINAR1 will be listed in a DNS directory with a corresponding IP address, such as 209.34.45.163. So instead of accessing the \\209.34.45.163\FREDC share to copy a file, you can ask to see \\TOTALSEMINAR1\FREDC. Your system will then query the DNS server to get TOTALSEMINAR1's IP address and use that to find the right machine. Unless you want to type in IP addresses all the time, a TCP/IP network will need at least one DNS server.

DHCP

Dynamic Host Configuration Protocol (DHCP) is an automated mechanism that assigns IP addresses to clients. A computer configured to obtain its IP configuration through DHCP will contact a DHCP server on the local network and get needed information from it. Other TCP/IP configurations settings, such as the local router or default gateway, can also be handed out by a DHCP.

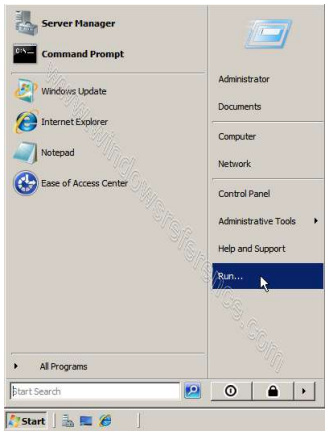
Using DHCP to assign IP configuration to client computers on your network simplifies administration and avoids the problem of IP information being entered incorrenctly. With DHCP, the DHCP server can be updated with the new IP addresses, and on the next reboot, all workstations will receive the new information.

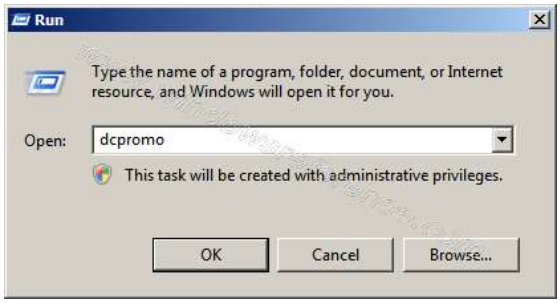
DHCP allocates an IP address to a client computer for a fixed period of time. This temporary allocation is called a lease. If the client still needs the IP address, the client must renegotiate the lease before it expires.

I will show how to set up and configure a Domain Controller, DNS and DHCP Server in the next sections.

Domain Controller and DNS Server

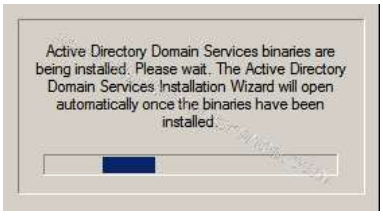
Here I will explain how to setup Windows Server 2008 Domain Controller and DNS Server. Click on Start > Run



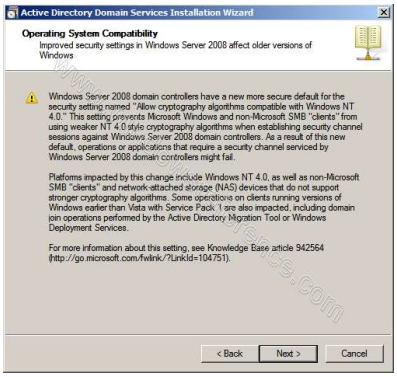


Now type dcpromo > Click OK

The system will start checking if Active Directory Domain Services (AD DS) binaries are installed, then will start installing them. The binaries could be installed if you had run the dcpromo command previously and then canceled the operation after the binaries were

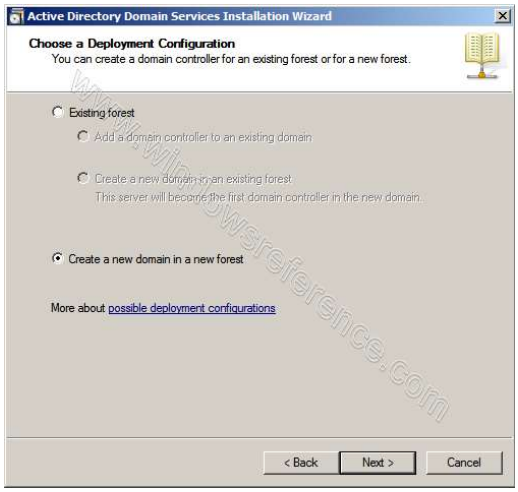


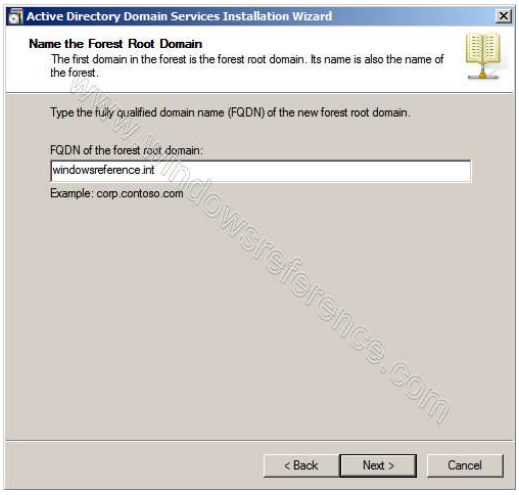
The Active Directory Domain Services Installation Wizard will start, either enable the checkbox beside Use Advanced mode installation and Click Next , or keep it unselected and click on Next



The Operating System Compatibility will be displayed, take a moment to read it and click Next

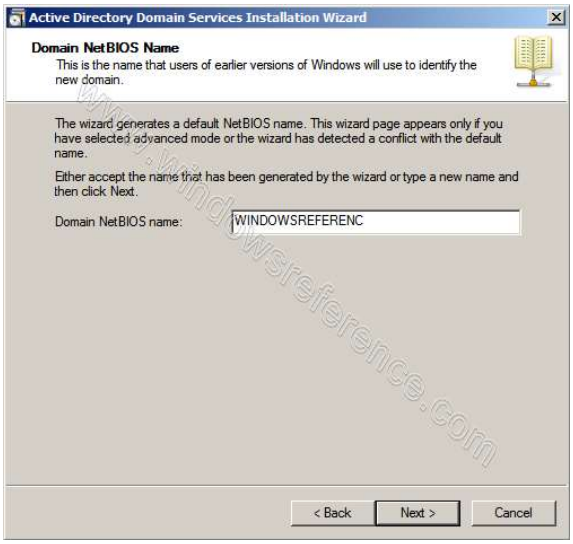
Choose Create a new domain in a new forest, page Click Next



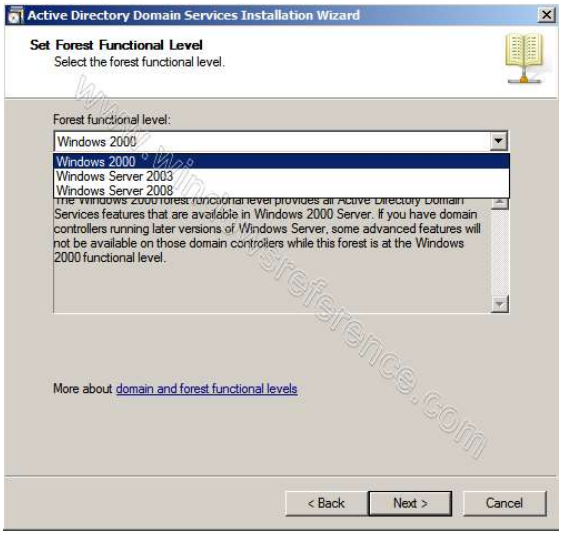


Enter the Fully Qualified Domain Name of the forest root domain inside the textbox, click Next

If you selected Use advanced mode installation on the Welcome page, the Domain NetBIOS Name page appears. On this page, type the NetBIOS name of the domain if necessary or accept the default name and then click Next.



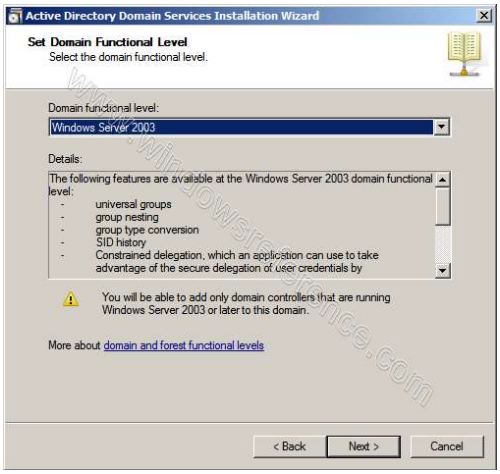
Select the Forest Functional Level, choose level you desire and click on Next.



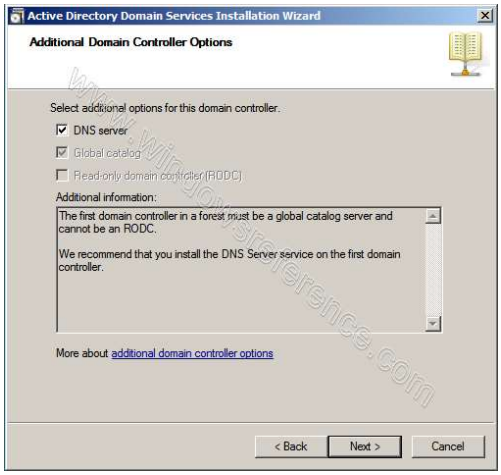
Make sure to read the description of each function to understand the difference between each one.

In the previous step, If you have selected any Forest Functional Level other than windows Server 2008 and clicked on Next , you would then get a page to select the domain Functional Level. Select it and then click on Next.

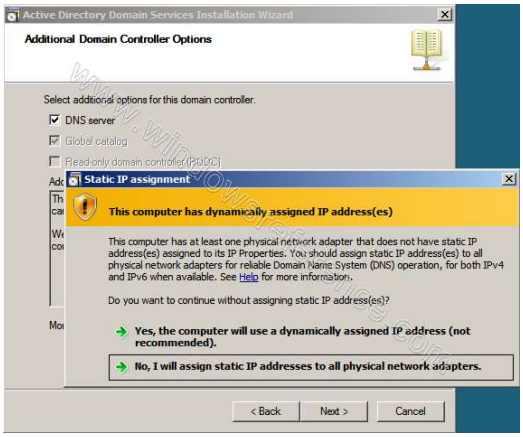
In the Additional Domain Controller Options page, you can select to install the domain Name Service to your server. Note that the First domain controller in a forest must be a Global Catalog that's why the checkbox beside Global Catalog is selected and it cannot be cleared. The checkbox is also selected by default when you install an additional domain controller in an existing domain, however you can clear this checkbox if you do not want the additional domain controller to be a global catalog server. The first domain controller in a new forest or in a new domain can not be a Read Only Domain Controller (RODC), you can later add a RODC but you must have at least one Windows Server 2008 Domain Controller.



I want to set my DC as a DNS Server as well, so I will keep the checkbox beside DNS server selected and click on Next



If you don't have static ip assigned to your server you will see similar to the following screen now you need to assign static ip and start the above process.

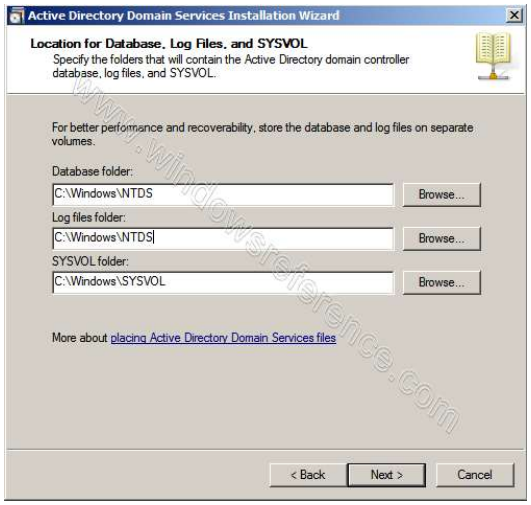


If the wizard cannot create a delegation for for the DNS server, it displays a message to indicate that you can create the delegation manually. To continue, click Yes

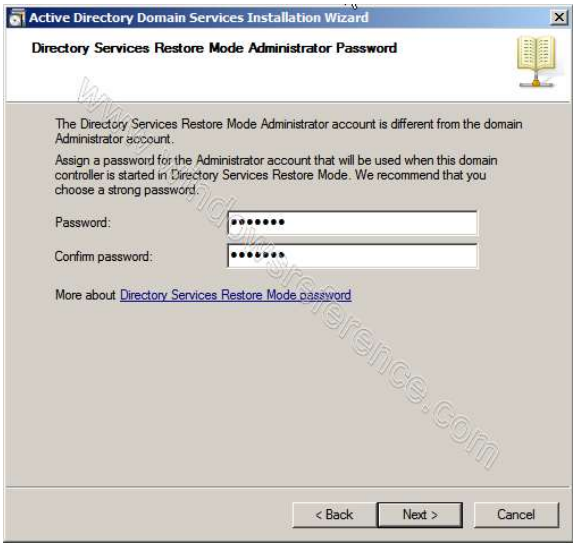
Now you will have the location where the domain controller database, log files and SYSVOL are stored on the server.

The database stores information about the users, computers and other objects on the network. the log files record activities that are related to AD DS, such information about an object being updated. SYSVOL stores Group Policy objects and scripts. By default, SYSVOL is part of the

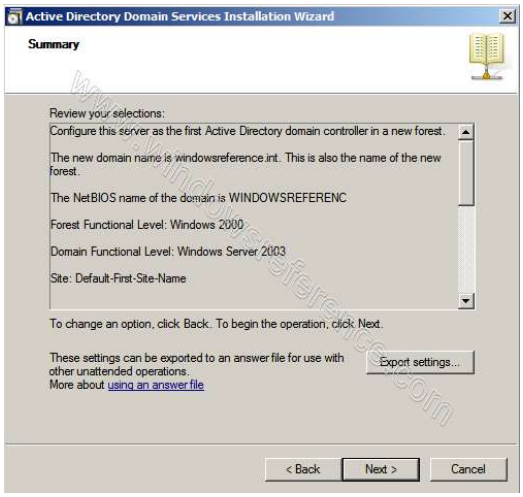
operating system files in the Windows directory either type or browse to the volume and folder where you want to store each, or accept the defaults and click on Next



In the Directory Services Restore Mode Administrator Password (DSRM) page, write a password and confirm it. This password is used when the domain controller is started in Directory Services Restore Mode, which might be because Active Directory Domain services is not running, or for tasks that must be performed offline.Make sure that you memorize this password when you need it.

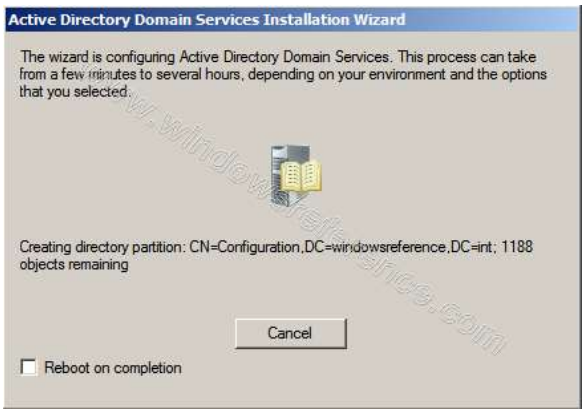


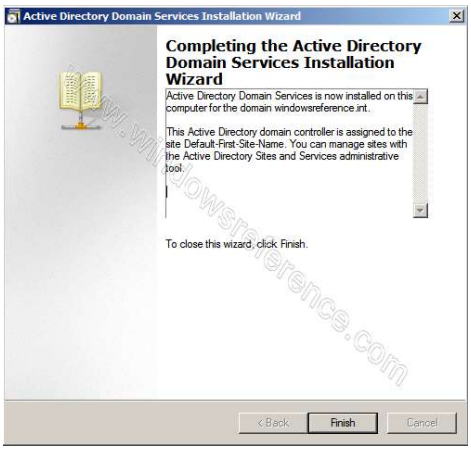
Summary page will be displayed showing you all the setting that you have set . It gives you the option to export the setting you have setup into an answer file for use with other unattended operations, if you wish to have such file, click on the Export settings button and save the file.



DNS Installation will start

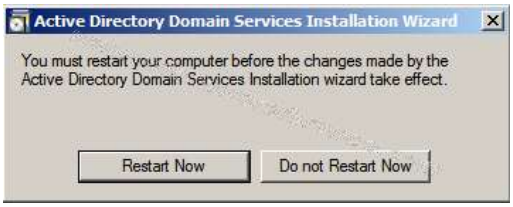
Followed by installing Group Policy Management





Configuring the local computer to host active directory Domain Services and other operations
will take place setting up this server as a Domain Controller active Directory Domain Services installation will be completed, click Finish.

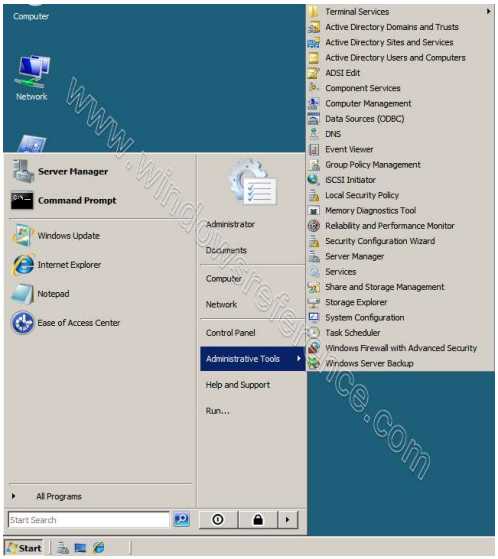
Click on Restart Now to restart your server for the changes to take effect.



Once the server is booted and you logon to it, click on Start > Administrative Tools
you will notice that following have been installed :

Active Directory Domains and Trusts

Active Directory Sites and Services
Active Directory Users and Computers
ADSI Edit
DNS
Group Policy Management



Group Policy Management

Now we have our new windows server 2008 domain controller with dns server setup and completed.

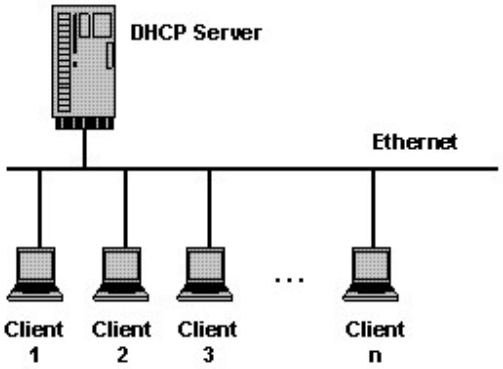
How it time to set up and configure the DHCP Server.

Configuring DHCP

Dynamic Host Configuration Protocol (DHCP) is a core infrastructure service on any network that provides IP addressing and DNS server information to PC clients and any other device. DHCP is used so that you do not have to statically assign IP addresses to every device on your network and manage the issues that static IP addressing can create.

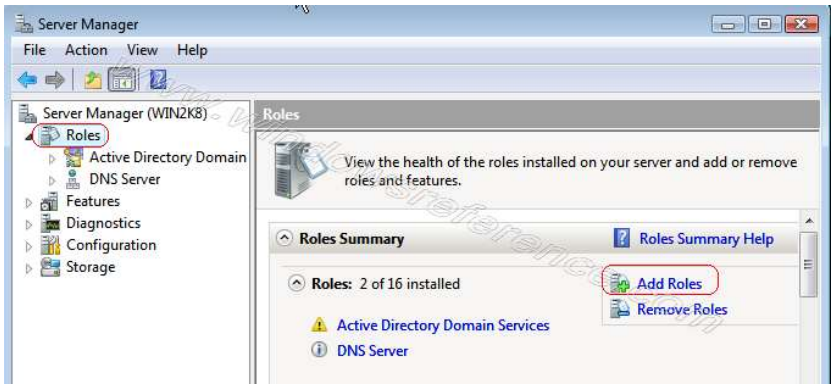
I have already discussed how to install and configuring the Domain Controller and DNS server in windows server 2008. Now I will install and configure DHCP server.

A DHCP Server assigns IP addresses to client computers. This is very often used in enterprise networks to reduce configuration efforts. All IP addresses of all computers are stored in a database that resides on a server machine.

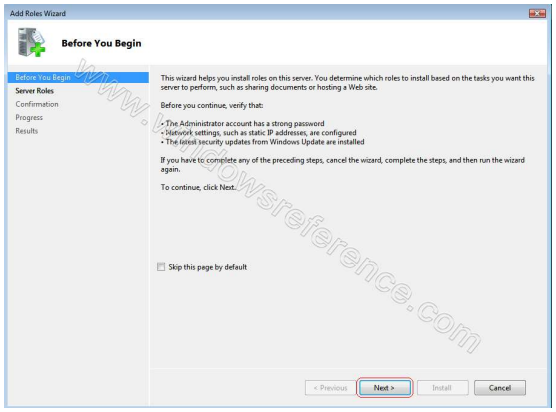


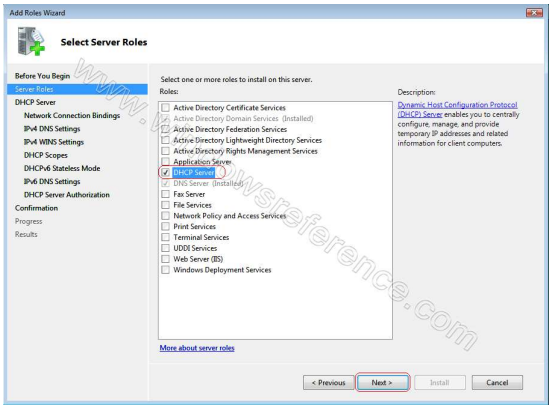
You need to open server manager from Start—>Administrative tools—>Server Manager

Once server manager opens click on Roles from left pane now you need to click on Add Roles from right pane



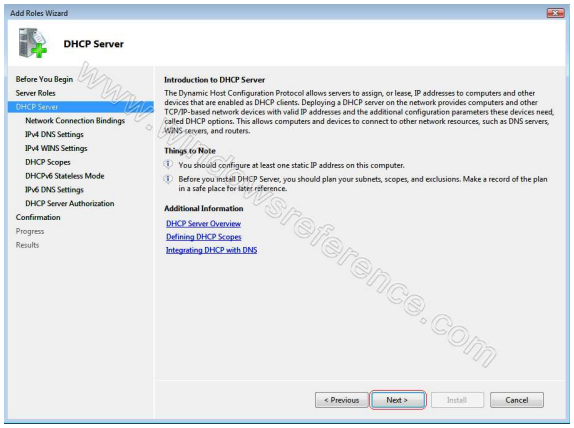
Now you can see introduction screen click next

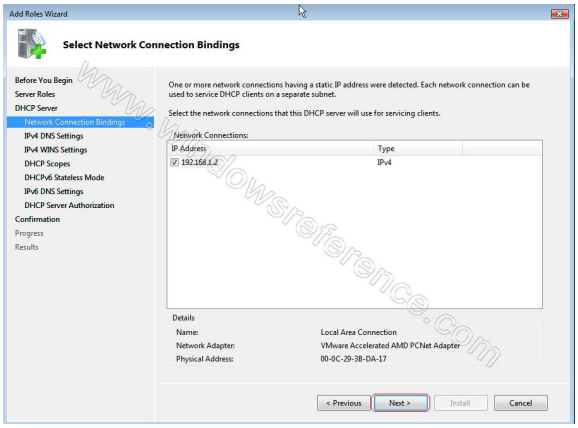




Here you need to select the DHCP Server click next

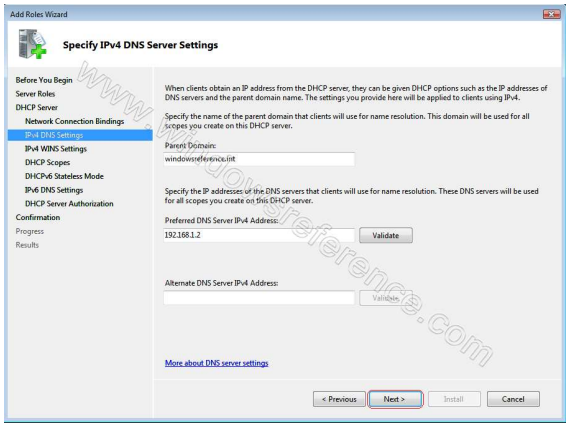
DHCP Server introduction details click nextand

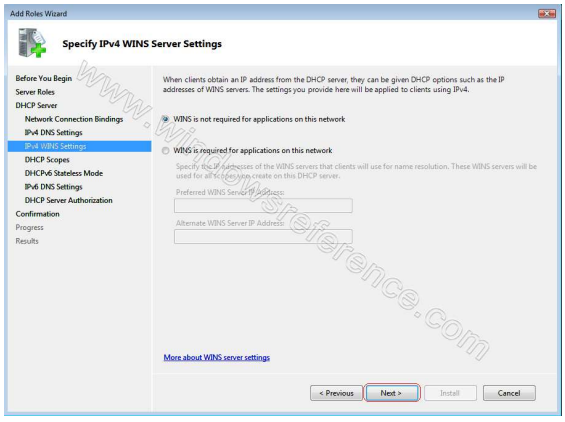




First it will try to check your server is having static ip address or not if it detects it will display here and click next

Here you need to enter your domain name and DNS servers click next

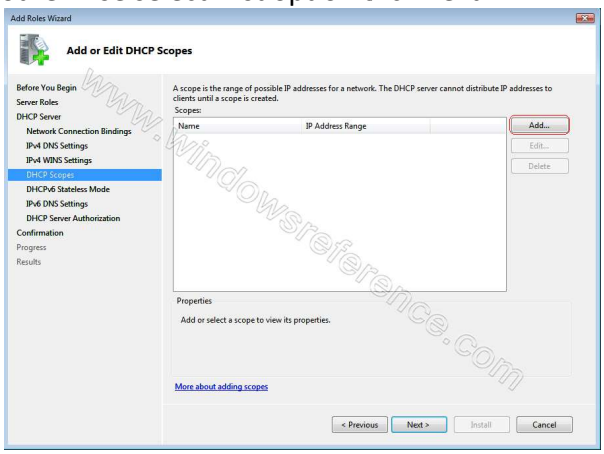




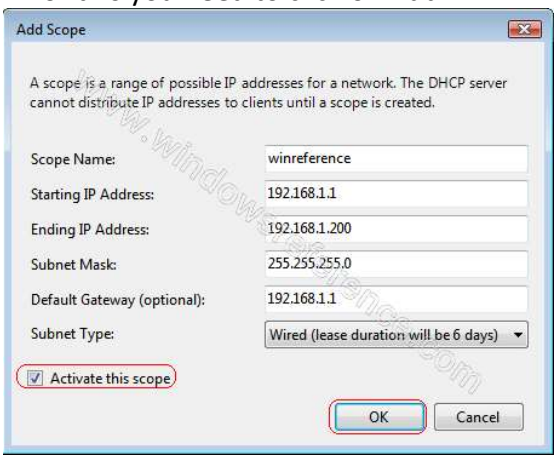
If you have WINS server enter details here

Now you need to add DHCP server scope

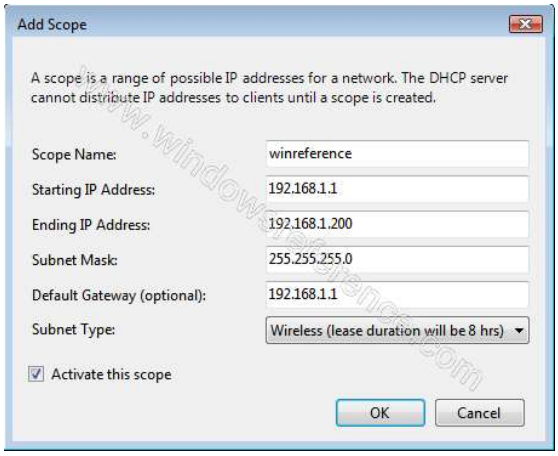
otherwise select first option click next

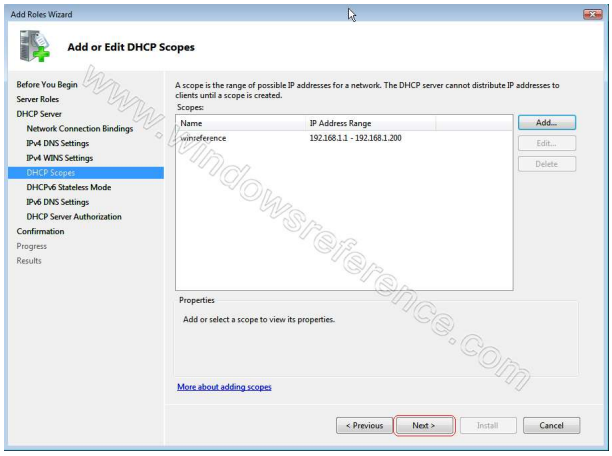


for this you need to click on Add

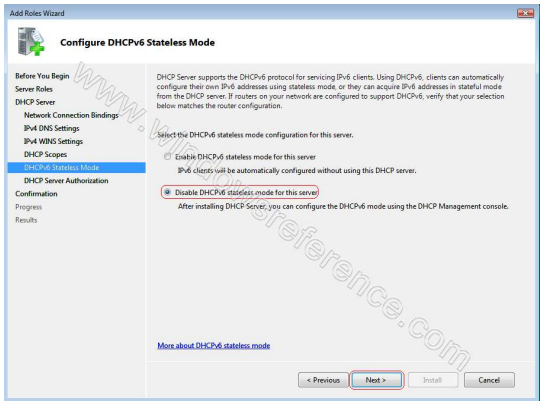


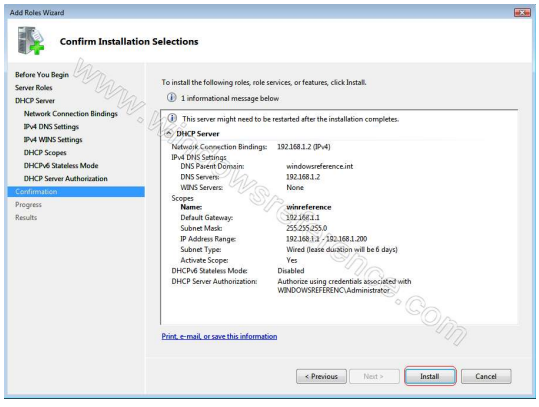
Enter your scope details and select check box next to Activate this scope option click ok





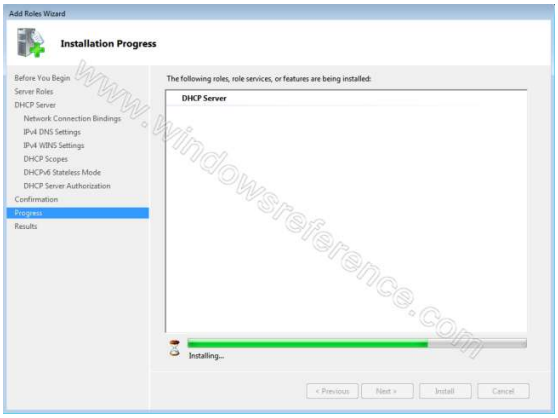
If you want to enable IPV6 for this server select here otherwise disable IPV6 for your DHCP server and click ok



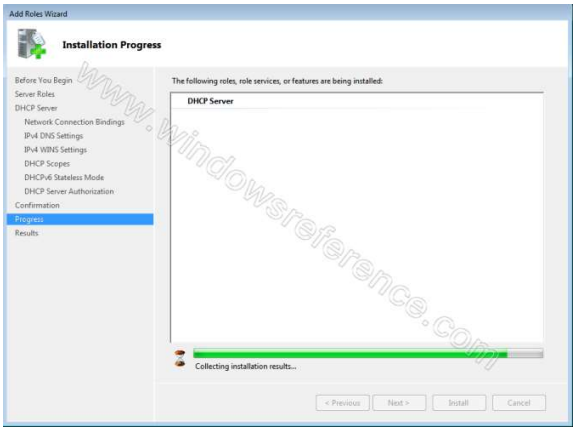


Select user credentials click next

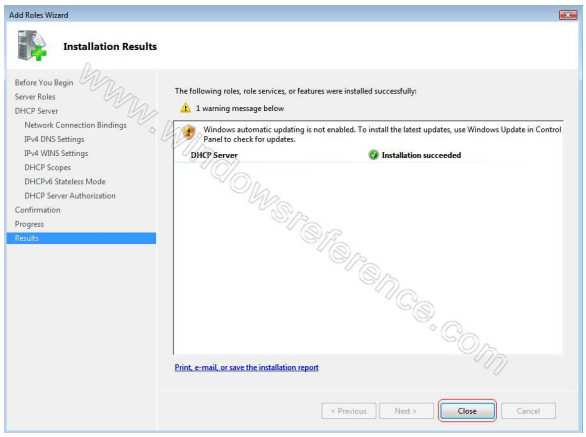
Confirmation about your selection click on install



DHCP server Installation in progress

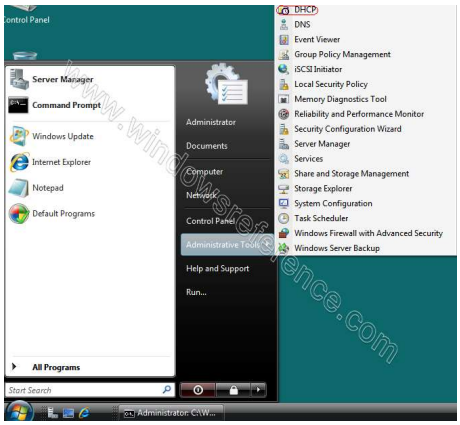


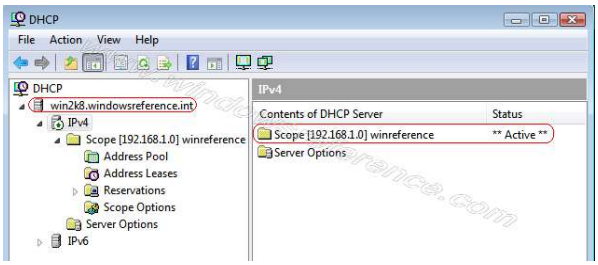
Installation Results and click on close



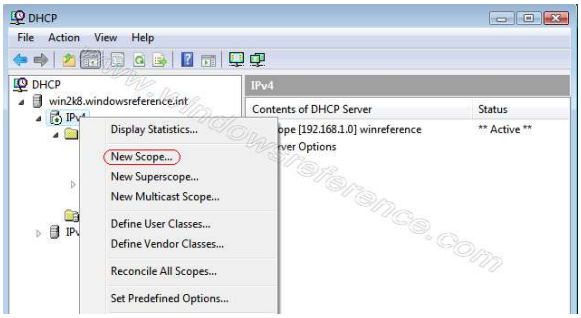
Now you can confirm DHCP server from server manager as follows

Open DHCP server from Start—>Administrative Tools—>DHCP

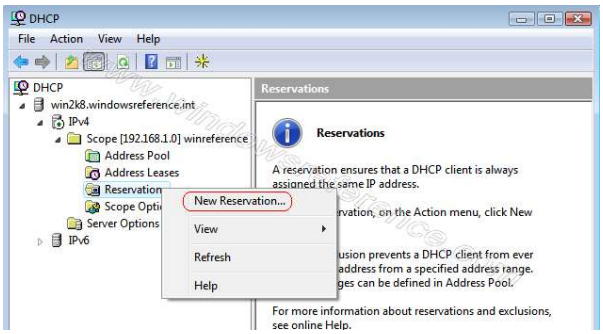




Create new scope



Right click on IPV4 select New Scope



Create new Reservation

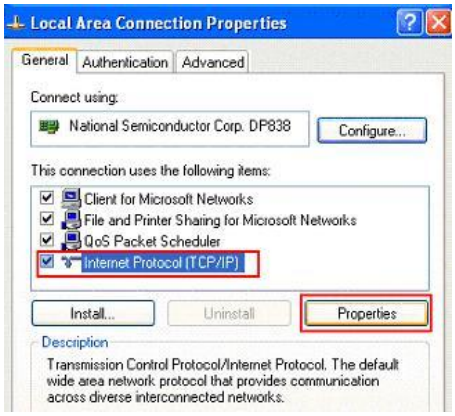
Right Click on Reservation select New reservation

Finally DHCP server is set up

Assigning Client IP address

Here are the step-by-step instructions showing how to set IP address and other network information on the Client Computers:

1) Go to **Start** and click on **Control Panel**.
2) Control Panel window will appear. Double click on **Network Connections**.
3) Network Connections window will appear. Right click correct **Local Area Connection** by identifying correct network card and click **Properties**.
4) Select **Internet Protocol (TCP/IP)**. Click on **Properties**.



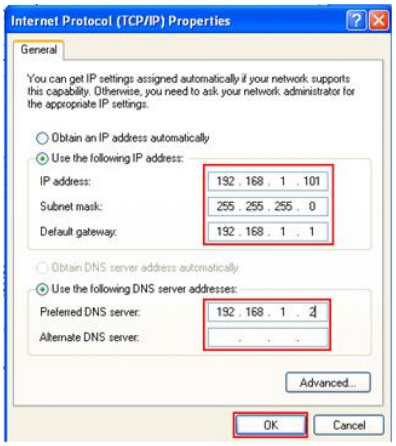
Manual IP Assigning

You can now key in the IP address, Subnet mask, Default gateway and DNS servers. Here is IP logical network Designing Guide.

Note: IP address of your computer must be unique. None of the 2 computers in the network can share same IP address, it causes IP address conflict.

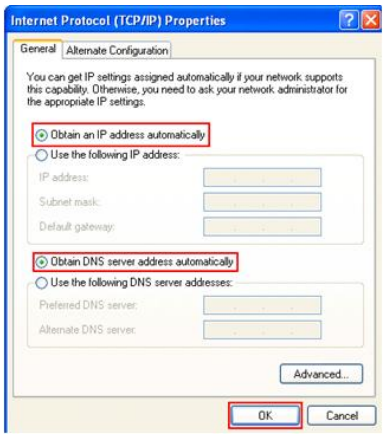
IP Assigned by DHCP server

If you have DHCP server setup on your router or you have DHCP server in network, your computer can be assigned address automatically by selecting **Obtain an IP address automatically** and **Obtain DNS server address automatically**.



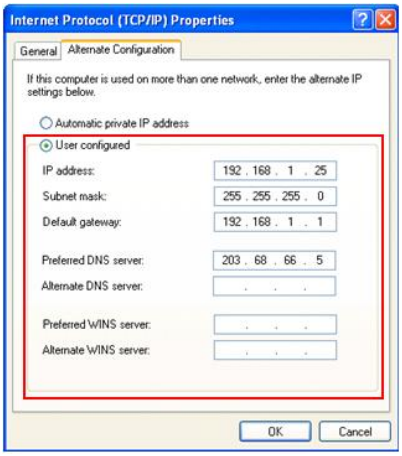
IP

You can also check out simple way to check IP address after knowing the way to set IP.



Note: If you have a notebook, using static IP at home and the IP assigned by DHCP server at the office, you can make use of **alternate configuration** to set IP and network information for these 2 different network.

Set **Obtain an IP address automatically** on **General** tab which is same as what I specified above, so that the notebook will be assigned IP addresses automatically at the office. After that, click **Alternate Configuration** tab, select **User configured** option and key in your home network's static IP information. By setting this, when there is no IP information assigned due to no DHCP server at home, this alternate configuration will be applied automatically, so that you don't have to set IP manually every time at home.



The I.P addresses assigned to my computers and devices

The DHCP has assigned the workstations in the office with the following IP addresses.

The Router:	**192.168.2.1**
The Server:	**192.168.2.2**
The Switch:	**192.168.2.3**
Pats Computer:	**192.168.2.4**
Computer No 1:	**192.168.2.5**
Computer No 2:	**192.168.2.6**
Computer No 3:	**192.168.2.7**
The Printer:	**192.168.2.8**

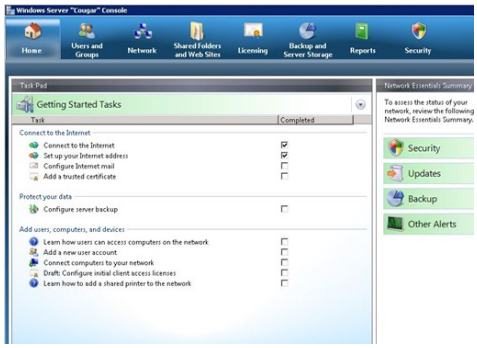
Active Directory

You must create a user account in Active Directory for each user who will access resources on the network.

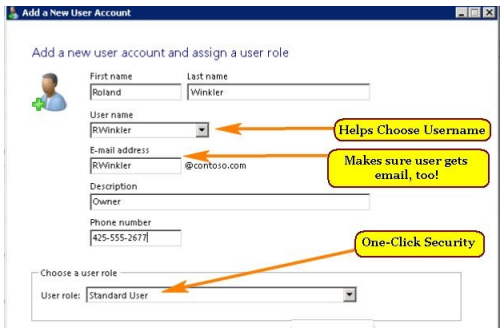
User Accounts

Within Active Directory you have to set up an account for each person, on the network. A user account is a collection of settings, preferences associated with a person, such as password and log on details.

The Server Wizards bring you step by step.



One click and the New User wizard guides you through a quick process to define an account and then the server takes care of everything else automatically. Creating a local user account when a domain user account was required, or forgetting to setup a machine account to go with the new user. All of those tasks are handled behind the scenes with just a minimum amount of user input.



Tasks like adding groups, deleting users, and adding devices are simple in Server 2008. Important tasks like assigning machine level privileges to the user account can't be forgotten, because the wizard brings up a screen specifically asking whether to assign an existing computer to the new account or add a new computer.

The administrator has full control of all the accounts and can provide different privileges allowed in each account. Here I will setup the log in details and passwords on the network allowing the users log into their account on any computer on the network.Now the network is set up and users can join the network anytime they want.

Maintaining the Network

Now that our network is up and running smoothly, it will need constant maintaining and attention. I will use Disk Cleanup and Disk Defrahmenter to clean up our PC's every so often.

Disk Cleanup

I can use the Disk Cleanup utility to remove unnecessary files, such as temporary Internet files, unused programs and Windows components, and deleted files. Disk Cleanup scans our drives for files that can be safely deleted, but still gives me the option to keep or delete these files. Disk Cleanup also gives me shortcuts to the Windows Components and Remove Programs windows so I can remove features and programs I don't use. I can also remove all restore points but the most recent one.

Disk Defrahmenter

Over time, our drive might become fragmented, meaning that individual files are broken up, with the parts saved in different physical spaces on the hard disk. Our computer's performance suffers when our disks becomes highly fragmented. This slowdown occurs because Windows has to access multiple locations on the disk to read or write all the various parts of our files.

Defragmenting our disk consolidated files so that each one is saved in a contiguous physical space on the disk. This makes access faster and used storage space more efficiently. Also, free space is consolidated so that new files are saved in contiguous free space.

I will also prevent common problems occurring by:

1. Keeping anti-virus software installed and up-to-date.

It's important to install, configure, and update anti-virus software, using a program that protects against malware, phishing, and adware. One way to check if anti-virus software is up-to-date is to open the Security Center in the Control Panel. Both Windows Vista and Windows 7 offer a Security Center, and both will warn you if your computer security is compromised.

2. Configuring and use Windows Update.

I can find Windows Update in the Security Center in the Control Panel. Choosing "on" under **Automatic Updates** to enable automatic updates for every computer on the network, and so I will always have the latest drivers, software updates, and security updates for our computer(s).

3. Configuring secure Internet Explorer 7 options.

Internet Explorer 7 offers many new features that will help me keep our network healthy. Two in particular are the Pop-Up Blocker and the Phishing Filter. Making sure both are enabled by clicking the **Tools** menu from the Internet Explorer interface. Internet Explorer 7 ships with Windows 7.

4. Configuring and using Windows Defender.

Windows Defender is included with Windows 7. I can access Windows Defender from the Security Center in the Control Panel. Windows Defender offers protection against malicious and unwanted software, allows me to scan our PC's for these threats, and lets me check for updates to Windows Defender automatically or manually. To keep our network as healthy as possible, I will make sure Windows Defender is enabled and configured to check for updates automatically.

5. Configuring and using Windows Firewall.

Windows 7 is shipped with Windows Firewall. As with other security features, Windows Firewall is available in the Control Panel's Security Center options. A firewall protects your network by preventing unauthorized users from gaining access to it through a network or the Internet. Windows Firewall is turned on automatically. A firewall is different from antivirus software, and is not a replacement for it. However, Windows Firewall and anti-virus software work together to help protect our computer and network.

6. Keeping backups of our your data.

Windows 7 offers the Windows Backup and Restore Center, where I can create and configure automatic backups of the data on our network computers. Windows Backup and Restore Center will remember to perform the backups we need, so I don't have to remember to do it myself. With Windows 7, we can now back up your files to an external hard drive, secondary hard drive, writable CD or DVD, or to a network location.

7. Protecting our computer from unwanted downloads.

User Account Control in Windows 7 improves the safety and security of your computer by preventing potentially dangerous software from making changes to our computers without my explicit consent. When software is deemed potentially dangerous, you are prompted to allow the software to run by inputting an administrator name and password. This helps keep our network healthy by incorporating the operating system, Windows Defender, and Internet Explorer 7, and helps reduce the impact of viruses, spyware, and other threats.

8. Taking care of our hardware.

I need to do more than secure our operating system. I also need to secure our hardware. This includes but is not limited to:

- Repairing or replacing frayed wires and cables, including power cords.
- Making sure surge protectors are installed and working.
- Making sure cables are not crimped, or under chair or desk legs.
- Making sure all equipment has adequate air flow.
- Avoiding shut downs and reboots (put the computer to sleep instead using Power Settings).
- Using canned air twice a year to blow dust from inside and around computer towers.
- Verifying wireless access points are properly placed.
- Verifying power outlets have not become overloaded.

Evaluate The Existing System

The system as it stands is fully functional at the moment, as everything is brand new and there are no problems with any of the components. The network itself is running smoothly, as there is only one server and four computers it is a small network, here is my evaluation of this network

The Server
This is a powerful server and could run a lot more computers of it, which we hope to add in the future.

The Computer
The ipower computers are ideal for the programmers, because they are fast and power full and perfect for game development

The Switch
The D-link switch is working fine , but I think if we put more devices on it we may start to have problems with it slowing down. I was going to get a 24 port switch but this seem to big a switch for this small office.

Router
The NetGear Router lets us connect to the internet with perfect ease, and we have had no problem with it so far.

The Printer
The printer I think is too big for this office, maybe we should have gone for something smaller. This printer scans and prints onto any size of paper.

The Internet Phone
This phone is ideal for us as we do be making a lot of international calls, so using Skype the calls are a bit cheaper.

Future Development of the I.T System

At the planning stage of this putting this company together, we foresaw that our company could increase our workload tenfold in the next few years, so this is why the computer equipment we bought is much more powerful than what is needed for a start up company. We don't foresee any major improvements in the next two to three years, except taking on one or two more staff, we have plenty of desk space, and the switch and server is well capable of handling more users.

We will have a budget for each year and part of the budget will be left for Improvements, repairs, upgrades of the current system. New computers will be the most expensive hardware, that we may have to buy and as new software applications are coming out all the time, which can be very expensive, and our budget won't cover, we may have to seek funding from other sources.

Hardware

Computers: New computers will be the most expensive hardware, that we will have to buy, as the work will grow new employees will be needed. We foresee getting a couple of new ipower computers in the next two to three years

Phones: As the company grows we will need more phones,

Adding Memory: In the coming years we will be upgrading RAM chips, or adding new ones to the second slot to increase its power and speed. Some think tanks claim memory is often more important than CPU power:

Memory is fast storage space. Typically, a computer can access memory chips quite quickly; access speeds are measured in nanoseconds (millionths of a second). Contrast this with hard drives, which have milliseconds (hundredths of seconds) access times. Even if a computer has powerful processor, it will run slowly if it's short on memory. By contrast, a less powerful CPU armed with a lot more memory may out-perform a more powerful but memory-starved CPU.

Software

Operating Systems

As Windows 7 and Windows Server 2008 R2 are not long out, we don't foresee changing our operating systems for the next five years. We will automatically get updates, which we will install every so often.

We will develop our own software

At Troodon we will be developing our own languages, to meet the software need for an ever growing industry. Our programmers will be able to successfully build systems of great complexity, working in the most popular game development languages such as C, C++, Java and Assembly languages..

Software engineering and artificial intelligence are compared and contrasted in terms of the problems they attempt to solve, the methods they employ, and the tools and techniques that are used. It will be a fusion of the two disciplines will be needed for many new software demands we will attempt to create.

The software systems created in Troodon in the future will evolve and adapt to the problems created in A.I, these systems will be continuously reshaped to fit the dynamic landscape of the changing requirements. Much of our software will be an improvement to what is already out there, and we look forward to selling this software as a by-product to other companies in the future.

Conclusion of I.T section

To end the I.T section of this project I will briefly look back on the various sections and give my personal comments.

The Planning Phase

The most important phase of our I.T system was the planning and designing phase. This is what we had to get right in the beginning. I have been working in I.T for the last 10 years and have seen nearly every problem, that could occur and most of these problems would not have occurred if proper planning had been put in place at the beginning.

The Setting-Up Phase

Since everything was brand new we had no problems in setting up the system. And since we had marked out where we wanted the contractors to put the networking wires and sockets, we knew where everything was going. We had told the contractors to place extra sockets along the walls, because we might change things around, or new computers might be added to the system latter on. We did change things around and everything worked perfectly. Connecting the components was the easy part, the operating systems were already installed, configuring the system was a lot harder and problematic, and setting up any network is never easy. The whole process took a few days to put together but eventually I got everything working.

Network

Now that the Troodon network is up and running, we could start bringing in the programmers and get our business going. We are still in the early days of starting up, and expect to see many problems with the network as the days, weeks and months pass by, but I hope to see it develop and expand as the years go by.

Bibliography

Books

CompTIA Strata, PC FUNDAMENTALS by CompTIA PRESS

Sams Teach Yourself Networking by Uyless Black published by SAMS

Comp A+ - PDF files

(sections used in chapter 7. 9. 10.13.16 and 21)

Websites

3. Game AI

Playing smart – Artificial Intelligence in Computer Games - Eike F Anderson. 2003.

http://old.zfxcon.info/zfxCON03/Proceedings/zfxCON03_EAndersonText.pdf
Retrieved: 01/04/10

Intelligent Agents in Computer Games – Multiple Authors. 1999. http://groups.csail.mit.edu/robotics-center/public_papers/vanLent99.pdf Retrieved: 01/04/10

5. **History of AI** – www.wikipedia.org/wki/history of A.I

9. **Dell PowerEdge -** www.dell.com/us/en/business/servers/server-poweredge-
IPower - packardbell.co.uk/showroom/desktop/ipower/ipower-2.0-i9520 uk
D-link Switch – www.dlink.com
BELKIN Internet Phone – www.belkin.com
NetGear Router – www.netgear.com
DocuColor 240 Printer - www.office.xerox.com/multifunction

10. **Windows 7 -** Wikipedia.org/wki/windows_7
Windows Server 2008 R2 - windowsserver2008.com

11. **Skype –** www.skype.com
Symantec – www.symantec.com

12. **Game Development Software**
Autodesk web page
http://www.autodesk.co.uk/adsk/servlet/home?siteID=452932&id=779580
Retrieved: 04/04/10

Middleware http://www.wisegeek.com/what-is-middleware.htm Retrieved: 04/04/10

Screenshot of Autodesk HumanIK
http://blog.digitalcontentproducer.com/briefingroom/wp-content/uploads/2009/08/autodesk_motionbuilder2010_humanik_features.jpg Retrieved 04/04/10

Screenshot of Autodesk Kynapse
http://img.directindustry.com/images_di/photo-g/game-and-animation-design-software-371646.jpg Retrieved: 04/04/10

PHP www.sitepoint.com/glossary.php Retrieved: 04/04/10

16. **Firewalls -** www.techtalkz.com
Data Back-up - www.novastor.com

17. **DNS Server -** *www.windowsreference.com*

18. **DHCP -** *www.windowsreference.com*

19. **IP Address -** *www.hubpages.com*

21. **Maintaining the network –** www.windows.com

25. **Marketing**

Tokyo Game Show Official Website http://tgs.cesa.or.jp/english/ Retrieved: 26/02/10

E3 Official Website http://www.e3expo.com/ Retrieved: 26/02/10
Gamescom Official Website http://www.gamescom-cologne.com/ Retrieved: 26/02/10
Game Developer Magazine Overview PDF
http://www.tsgamegroup.com/pdfs/Gama09_GDMag.pdf Retrieved : 04/04/10

Edge Magazine http://www.edge-online.com/ Retrieved: 04/04/10