

Introduction To Routers

Introduction

Welcome to the Routers section. Here we will analyse routers quite some depth; what they do and how they work. I point out to you that you should have some knowlege on the OSI model and understand how data is sent across the network medium. If you find the information a bit too confusing or don't quite understand it, I would suggest you go back to the networking section and do some reading on the OSI model and Protocols.

You will find information on Cisco routers at the end of this page.

What are they and what do they do ?

Routers are very common today in every network area, this is mainly because every network these days connect to some other network, whether it's the Internet or some other remote site. Routers get their name from what they do.... which is route data from one network to another.

For example, if you had a company which had an office in Sydney and another one in Melbourne, then to connect the two you would use a leased line to which you would connect a router at each end. Any traffic which needs to travel from one site to another will be routed via the routers, while all the other unnecessary traffic is filtered (blocked), thus saving you valuable bandwidth and money.

There are two type of routers: 1) Hardware routers 2) Software routers.

So what's the difference ?

When people talk about routers, they usually don't use the terms "hardware" or "software" router but we are, for the purpose of distinguishing between the two.

Hardware routers are small boxes which run special software created by their vendors to give them the routing capability and the only thing they do is simply route data from one network to another. Most companies prefer hardware routers because they are faster and more reliable, even though their cost is considerably more when compared with a software router.

So what does a hardware router look like? Check the picture below, it displays a Cisco 1600 and 2500 series router along with a Netgear RT338 router. They look like a small box and run special software as we said.

CISCO 1600 Series Router CISCO 2500 Series Router NetGear RT338 Router

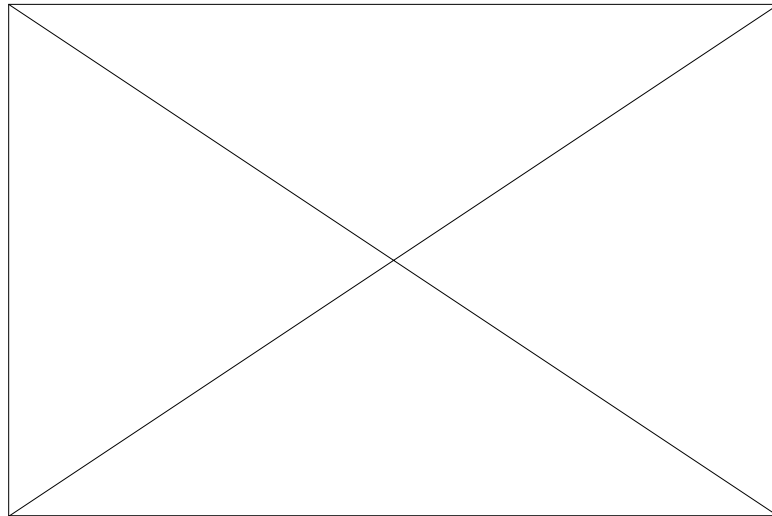


Software routers do the same job with the above hardware routers (route data), but they don't come in small flashy boxes. A software router could be an NT server, NetWare server or Linux server. All network servers have built-in routing capabilities.

Most people use them for Internet gateways and firewalls but there is one big difference between the hardware and software routers. You cannot (in most cases) simply replace the hardware router with a software router. Why? Simply because the hardware router has the necessary hardware built-in to allow it to connect to the special WAN link (frame relay, ISDN, ATM etc), where your software router (e.g a NT server) would have a few network cards one of which connects to the LAN and the other goes to the WAN via the hardware router.

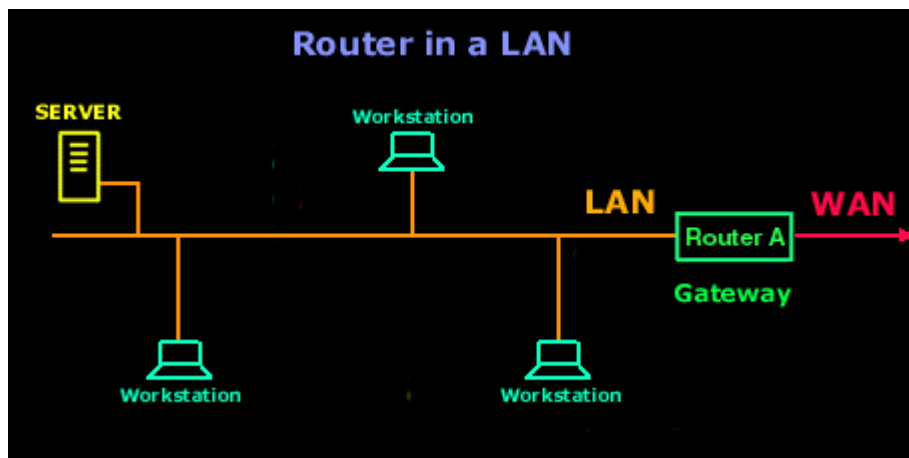
I have seen a few cards in the market which allow you to connect an ISDN line directly into them. With these special cards, which retail from \$5000 to \$15000 depending on their capacity, you don't need the hardware router. But as you can understand, it's a much cheaper solution to buy a hardware router. Plus, the hardware routers are far more advanced and faster than the software routers since they don't have to worry about anything else but routing data, and the special electronic components they have in them are developed with this in mind.

The Flash image below shows us what a router does when it receives packets from the LAN or the Internet. Depending on the source and destination, it will pass them to the other network or send them to the Internet. The router is splitting the below network into 2. Each network has a hub to which all computers on that network connect to. Further more, the router has one interface connected to each network and one connected to the Internet, this allows it to pass the packets to the right destination:



(You can click on the GO button)

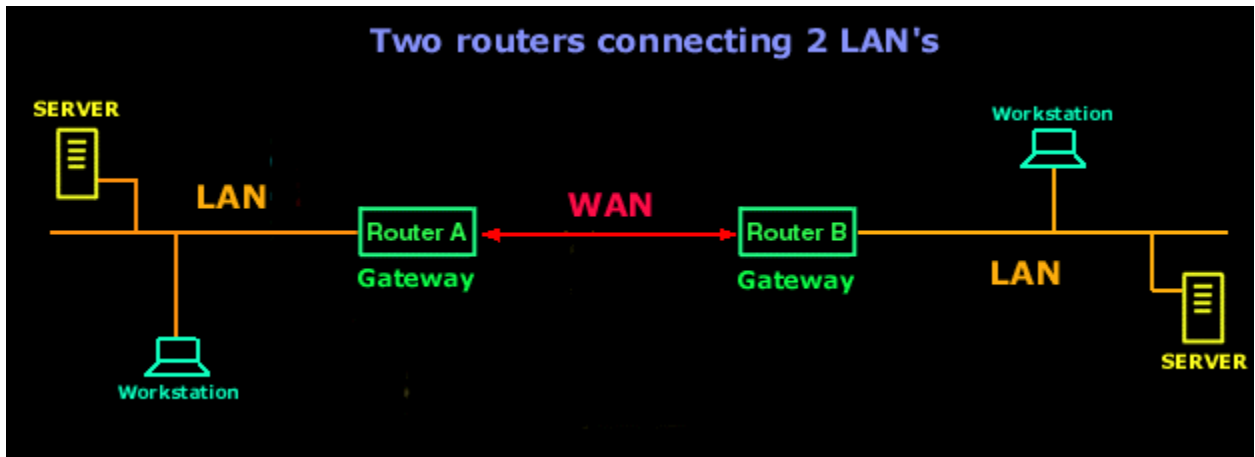
The picture below illustrates a router's place in the Local Area Network (LAN):



In the example shown, the workstations see the router as their "gateway". This means that any machine on this LAN that wants to send a packet (data) to the Internet or anywhere outside its Local Area Network (LAN) will send the packet via the gateway. The router (gateway) will know where it needs to send it from there on so it can arrive at its destination.

This explains the reason you need to add an Internet Protocol (IP) number for a gateway, when you have a LAN at home or in the office, in your TCP/IP network properties on your windows workstation.

The above figure shows only one example of how routers connect so the LAN gets Internet access. Let's have a look how 2 offices would use routers to connect them.



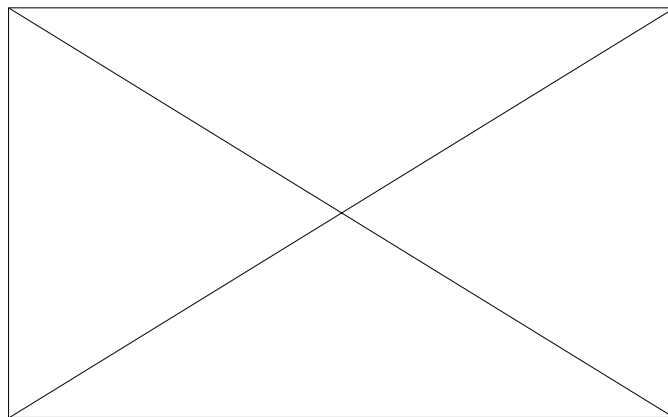
The routers in the above picture connect using a particular WAN protocol, e.g ISDN.

In reality, there would be a cable (provided by your service provider) which connects to the "WAN" interface of the router and from there the signal goes straight to your service provider's network and eventually ends up at the other router's WAN interface.

Depending on the type of router you get, it will support one of the most commonly used WAN protocols: ISDN, Frame Relay, ATM, HDLC, PPP. These protocols are discussed in the protocols section.

It's important to note down and remember a few of the main features of a router:

- Routers are Layer 3 devices
- Routers will not propagate broadcasts, unless they are programmed to
- Most serious routers have their own operating system
- Routers use special protocols between them to exchange information about each other (not data)



(You can click on the GO button)

The above flash shows you how routers on the Internet work. In the example, your computer which is located on the left is requesting data from a web server and the web server is responding to your computer by sending it the requested data. The path which is taken for all transactions will not remain the same, but will change, depending on the traffic and best routes available.

Now that you have a good idea of what a router looks like and what its purpose is, we are going to have a good look at one of the most popular router brands - Cisco.

Please choose one of the following sections:

Basics of Cisco routers - Learn the basics for the popular Cisco routers

The Modes in a Cisco router - Learn how to configure Cisco routers

Routing Protocols - Common protocols routers use to communicate and exchange information