

Administration of Operating Systems

DO2003

<http://www.hh.se/do2003>

Configuring and monitoring a LAN

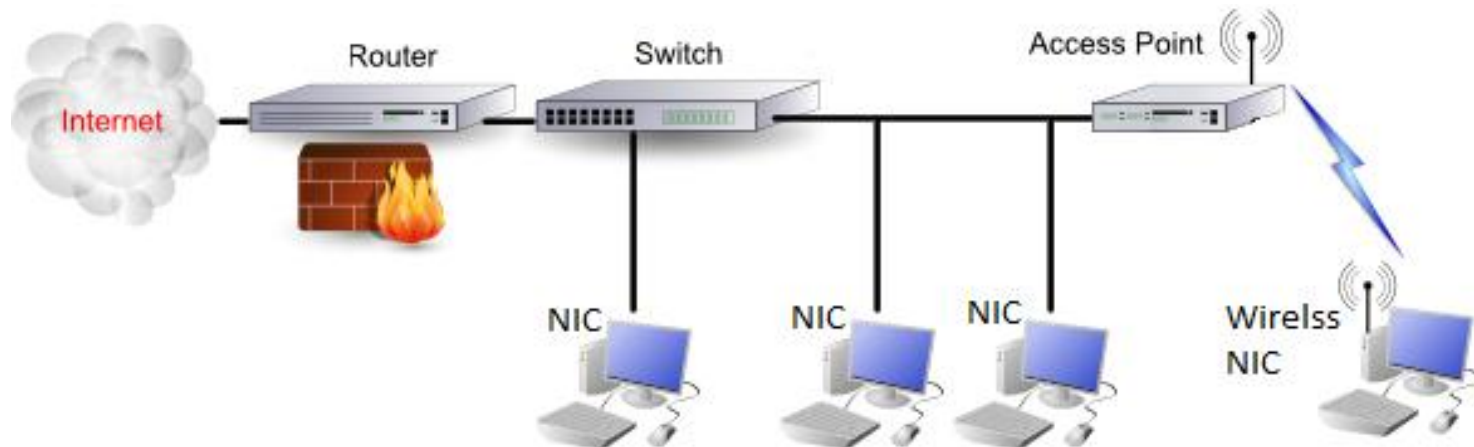


Network overview

- Main characteristics
 - Facilitate communications
 - Email, chat, ...
 - Permit sharing of files, data, and other types of information
 - Share network and computing resources
 - Better use of resources
 - May be insecure
 - Users and intruders
 - May be difficult to set up
 - If the number of nodes is high

Hardware

- Computers, printers, ...
- NIC and wireless NIC
 - Every NIC has a built-in unique identifier, the MAC address
 - Some NICs allow to change the MAC address on the NIC
- Wired or wireless
- Hubs and switches: Connect devices
- WAP: Connects wireless devices and connects wired and wireless networks
- Router: Connects networks (another LAN or Internet), NAT, firewall



Configuring the system

- Normally, the system will detect and configure new hardware automatically
 - After you have installed the OS
 - At the first time you boot the system after you install a NIC
- If a DHCP server is NOT present, you will need to know
 - The system's IP address
 - Selected among the private address space
 - The netmask (subnet mask)
 - The IP address of the gateway
- Most Ethernet configuration is centralized in a single file, `/etc/network/interfaces`

/etc/network/interfaces

```
$ cat /etc/network/interfaces
```

```
# This file describes the network interfaces available on your system  
# and how to activate them. For more information, see interfaces(5).
```

```
# The loopback network interface
```

```
auto lo
```

```
iface lo inet loopback
```

```
auto eth0
```

```
iface eth0 inet dhcp
```

The eth0 device come up automatically when you boot

The interface (“iface”) eth0 has an IPv4 address space

The interface (“iface”) eth0 gets its configuration automatically from DHCP

```
#iface eth0 inet static
```

```
#address 192.168.0.2
```

```
#netmask 255.255.255.0
```

```
#gateway 192.168.0.1
```

UNCOMMENT to configure the Ethernet device
with a static IP address

```
iface eth1 inet static
```

```
address 192.168.0.23
```

```
netmask 255.255.255.0
```

```
gateway 192.168.0.1
```

A second network interface in the system, is identified with eth1

In this case, it is configured with a static IP address

```
$ sudo /etc/init.d/networking restart
```

```
...
```

Tools

- Ndiswrapper
 - Some vendors do not release specifications of the hardware or provide a Linux driver for their wireless network cards
 - Ndiswrapper is a Linux module which allows Ubuntu to use the Windows driver for wireless cards
 - The Ndiswrapper implements a Windows kernel API and NDIS (Network Driver Interface Specification) API within Linux kernel

Tools to inspect system hardware

lspci [options]

- Utility for displaying information about PCI buses in the system and devices connected to them.
- By default, it shows a brief list of devices

lshw [options]

- Extracts detailed information on the hardware configuration of the machine, such as memory configuration, firmware version, motherboard configuration, CPU version and speed, cache configuration, bus speed, etc.

```
$ sudo lshw
ubuntu
  description: Computer
  version: None
  width: 32 bits
  capabilities: smbios-2.4 dmi-2.4 smp-1.4 smp
  configuration: administrator_password=enabled boot=normal cpus=1 ...
  core
    description: Motherboard
    product: 440BX Desktop Reference Platform
    vendor: Intel Corporation
```

Tools for network monitoring

- Cacti
 - Network monitoring tool that graphs system and network information over time (time-series data)
 - Provides a comprehensive Web interface for browsing and examining the ongoing performance of the devices on a network
 - Can collect also data about CPU utilization, disk space usage, page views on a Web server, among others
 - These information can be used to gain insight into the ongoing behavior of a system and network and help to resolve problems
 - The information also can be used to perform preventive maintenance, i.e., to predict and avoid events that may happen in the future
 - Is a LAMP application
 - You will need to install and configure Apache, MySQL and PHP to setup Cacti

Servers and systems on a network

- Firewall
 - Protect networks from unauthorized access while permitting legitimate communications to pass
- NIS (Network Information Service)
 - Provide a uniform login regardless of which system you log in on
- NFS (Network File System)
 - Allows users to share directory hierarchies. Sharing directories using NFS requires that the server export the directory hierarchy and that clients mount the hierarchy

Servers and systems on a network

- OpenSSH
 - Include tools that provide encrypted communication sessions over a computer network using the SSH protocol
 - Allow users to login to remote system, copy files to and from remote system, ...
- DNS (Domain Name Service)
 - Internet service that maps IP addresses and fully qualified domain names (FQDN) to one another
 - DNS cache
 - Reduces the traffic between the LAN and the Internet and can improve response times

Servers and systems on a network

- DHCP (Dynamic Host Configuration Protocol)
 - Enables a client system to retrieve network configuration information from a server each time it connects to a network
- LDAP (Lightweight Directory Access Protocol)
 - Database server that can hold names and addresses, authentication information, and other types of data
- Samba
 - Allows Linux systems to participate in a Windows network, sharing directories and printers, and accessing those directories and printers shared by Windows systems

