EECP 0442
V2.0

Computer Network

Week 1 – Introduction to Networking

- Overview of Network and Internet

1 Requirement of Internet Connection

- Physical Connection
- Logical Connection
- Application
  - Link
    - Internet Tutorial
    - http://library.albany.edu/internet/

1.1 Physical Connection (NIC)

- Network Interface Card
  - **When selecting a NIC, consider the following factors:**
  - **Protocols – Ethernet, Token Ring, or FDDI**
  - **Types of media – Twisted-pair, coaxial, wireless, or fiber-optic**
  - **Type of system bus – PCI or ISA**
  - **http://www.linfield.edu/~darnett/helpages/NICinstall/NICStart.html (Installing NIC)**

NIC (Cont)

NIC (Cont)

1.2 Logical Connection (TCP/IP) description and configuration

- TCP/IP – Transmission Control Protocol/Internet Protocol is a set of protocol developed to allow computer to share resources
- TCP/IP can be configure using OS tool

TCP/IP - IP

- ***IP-address:***
  Each Ethernet board worldwide has a unique Ethernet-address, it is a 48 bit number
  (the first 24 bits indicate the manufacturer, the last 24 bits are a unique number for each Ethernet board/controller-chip assigned by the manufacturer).
  This is also called the MAC-address.

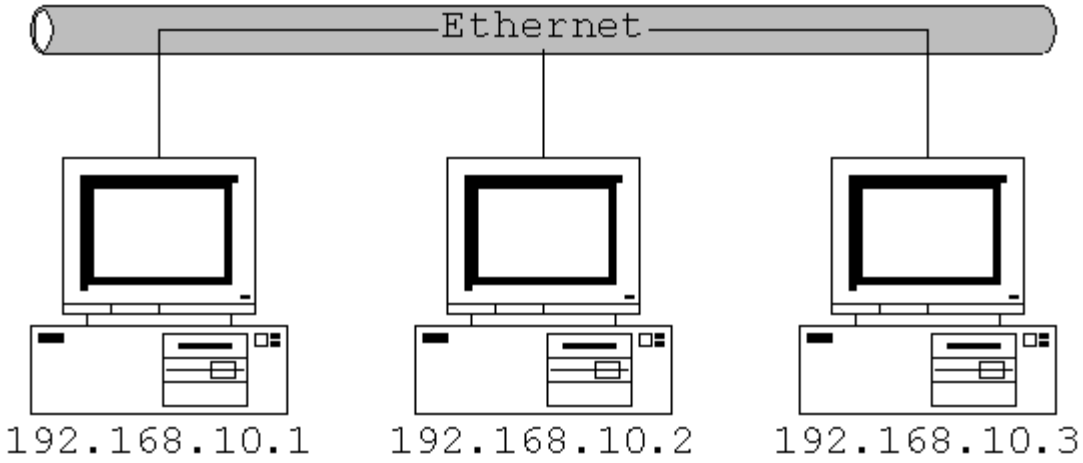
TCP/IP -IP

- When systems on a local area network ("LAN") are configured with NetBEUI or IPX/SPX protocol, they use these hardware-addresses to identify each other, so there is no need to define manually a network address.
  But TCP/IP was designed as a Wide-area-network ("WAN"), able to continue to function, even if part of the network was not operating (damaged or destroyed).

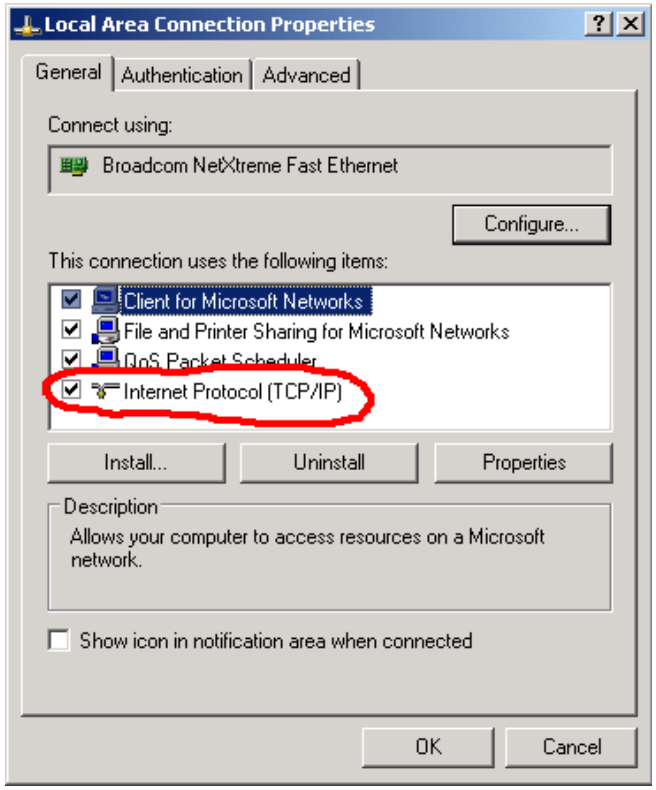
TCP/IP - IP

- TCP/IP uses IP-addresses, which are 32-bit numbers. To make it easier to memorize such IP-addresses, they are usually expressed as 4 8-bit numbers (example: 192.168.10.1), where each of the 4 numbers is within the range of '0' to '255' (there are restriction on using '0' and '255', avoid using them.).
  When setting up a small private network, you are free to use ANY IP-address, however, when you are connected to a company network, you need to ask the Network-administrator to assign you an IP-address. And if you are connected to the Internet, your ISP (Internet Service Provider) will assign an IP-address to you.
  Even if a network is NOT connected to the Internet, it has become custom to use on private networks a range of IP-addresses, which are reserved for private networks (that makes it later possible to connect your private network to the Internet without having to re-configure everything). The reserved IP-address is: **192.168.x.y**, where x=same number on all systems and y=different/unique number on all systems.
  A small network of 3 systems would use:

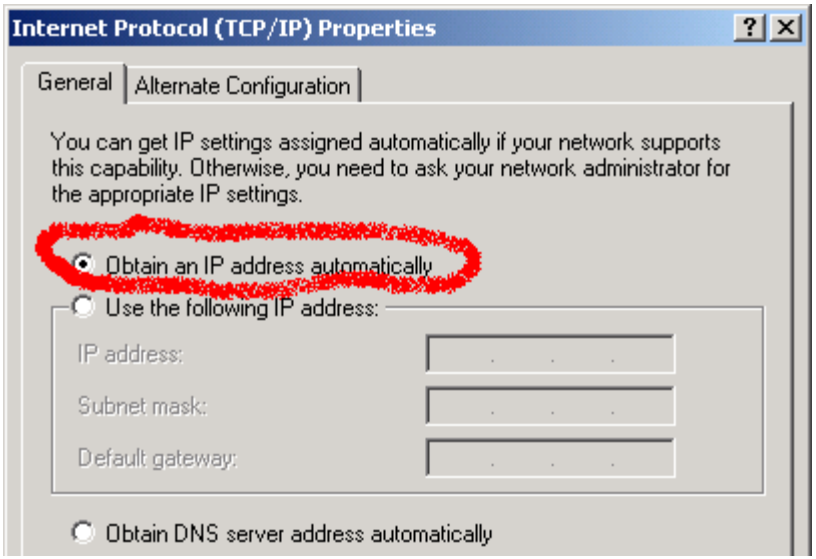
TCP/IP -IP



Configure TCP/IP on window based machine



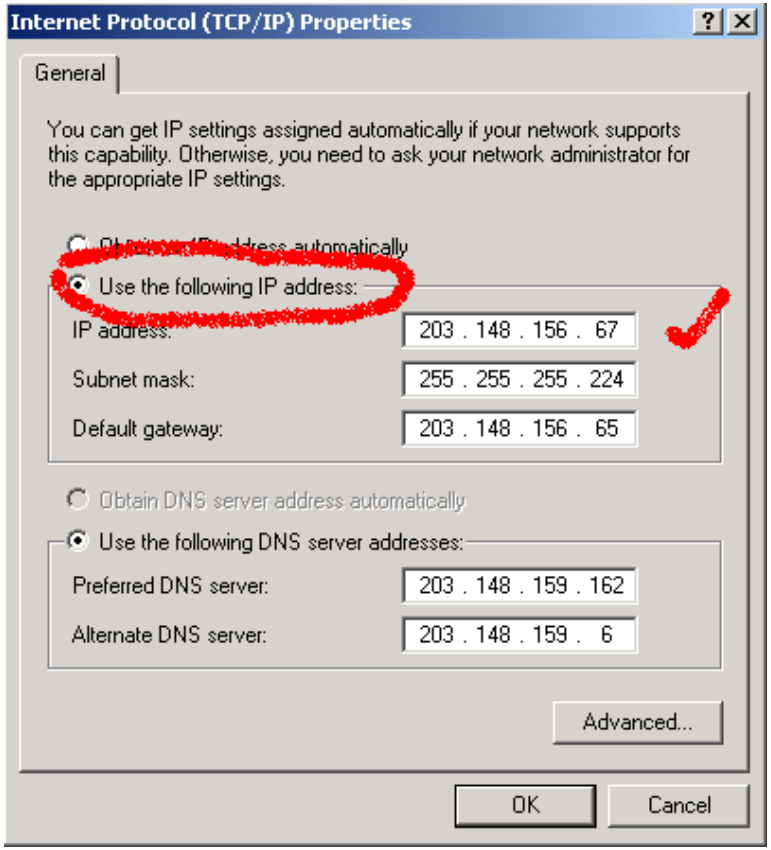
Configure TCP/IP on window based machine



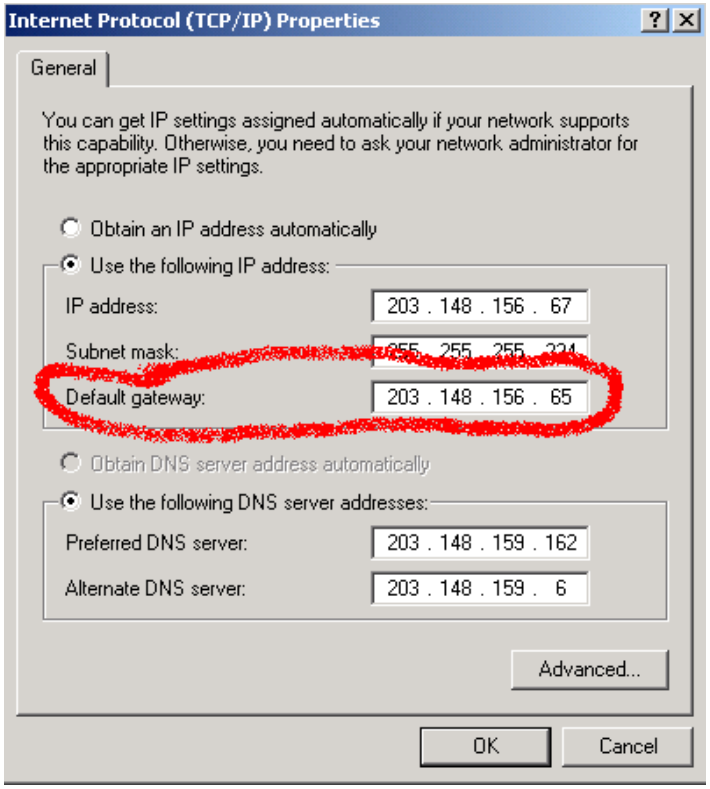
IP- Comfig. Using HDCP

- To be able to make this automatic assignment, there needs to be now on the network a database, keeping track of possible IP-addresses and to whom these addresses have been assigned:
  DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol)

IP config. Usig static config



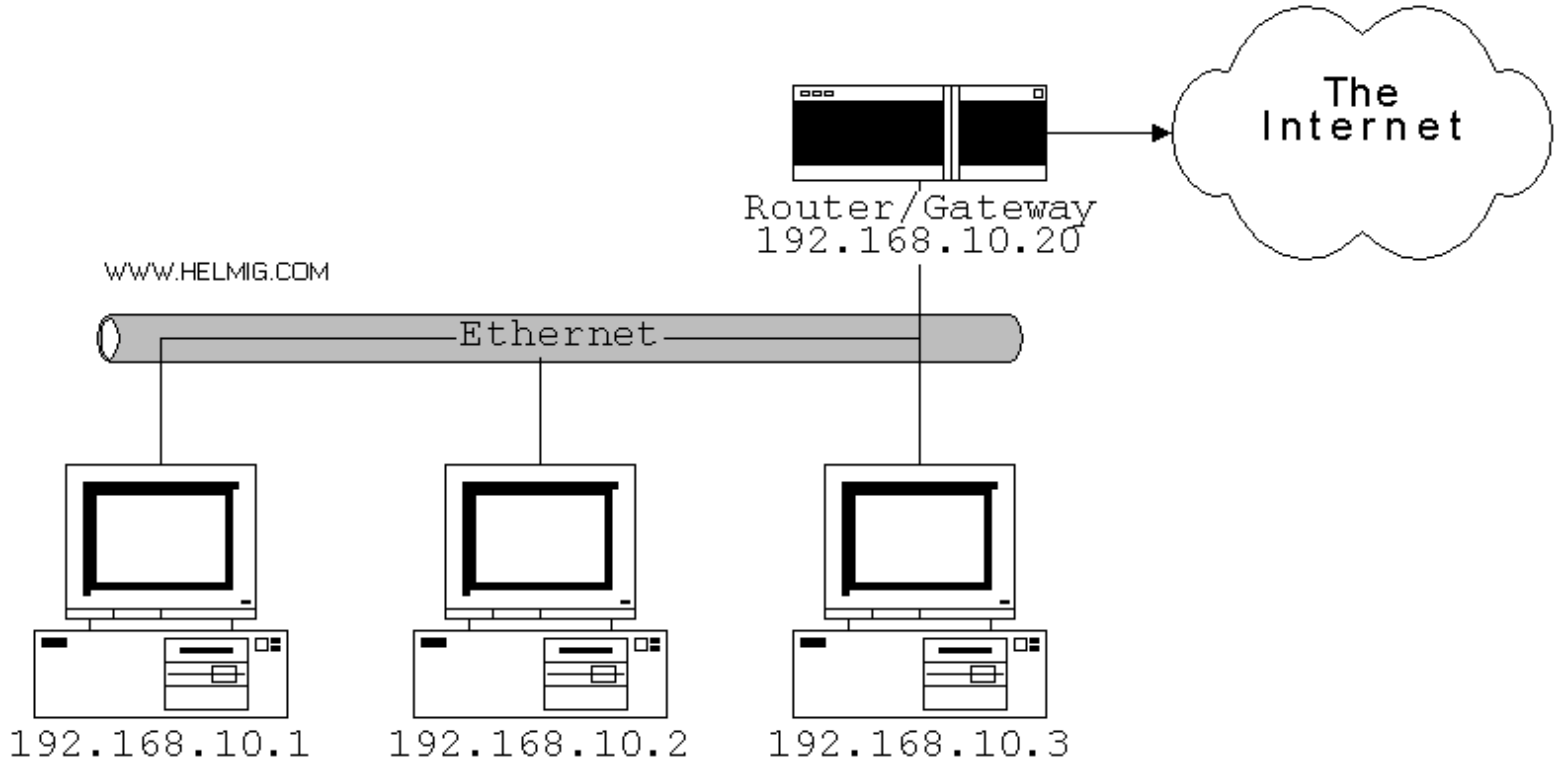
Gateway and Router



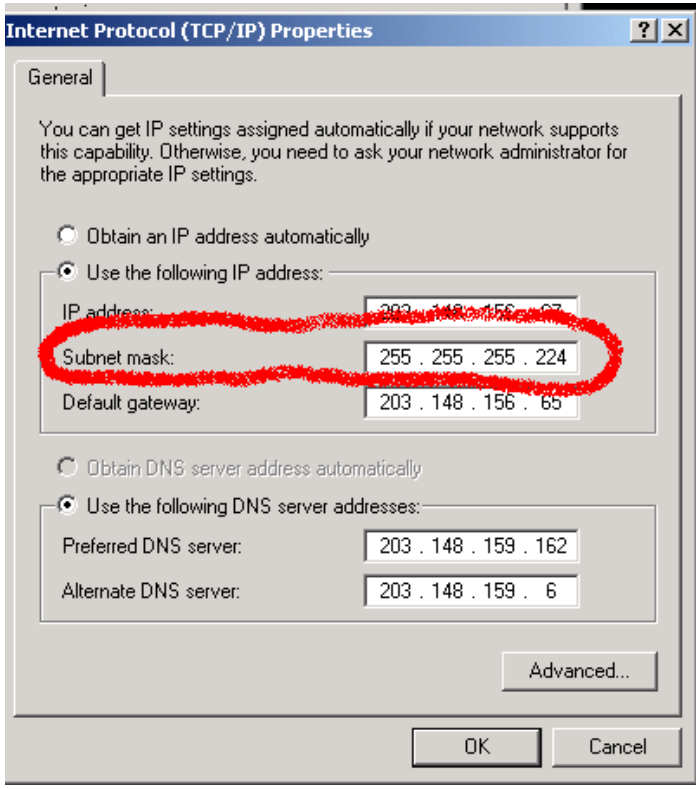
Gateway and Router

- ***Gateway/Router***:
  To connect a TCP/IP local-area-network to another TCP/IP LAN (which could be the complete Internet) or via a Wide-Area-Network (WAN), you need now a device called : **Gateway** or **Router**

Gateway and Router



Subnet-mask


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask: 255 . 255 . 255 . 224
Default gateway: 203 . 148 . 156 . 65
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 203 . 148 . 159 . 162
Alternate DNS server: 203 . 148 . 159 . 6
Advanced...
OK
Cancel

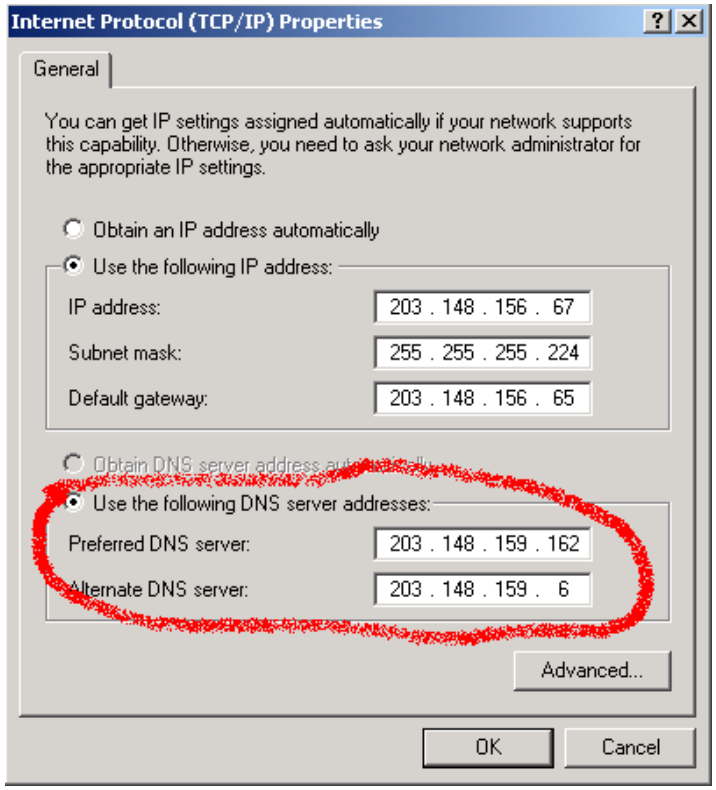
Subnet-mask

- Now, also the 'Subnet-Mask', which is usually '255.255.255.0', becomes important: if you now like to connect to 207.68.137.53 (which is the Website of Microsoft), TCP/IP checks your own IP-address and the IP-address of the destination against the Subnet-mask.
- Subnet-mask basically tell we how may IP address are in the same group.

DNS (Domain Name Service)

- ***DNS***:
  Too much work to typ these IP-addresses ?
  Looks like another item for automation, and exactly that is **DNS** : **D**omain **N**ame **S**ervice: it allows to use names instead of IP-addresses, but you need to configure it as part of the TCP/IP-

DNS


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 203 . 148 . 156 . 67
Subnet mask: 255 . 255 . 255 . 224
Default gateway: 203 . 148 . 156 . 65
Use the following DNS server addresses:
Preferred DNS server: 203 . 148 . 159 . 162
Alternate DNS server: 203 . 148 . 159 . 6
Advanced...
OK
Cancel

1.3 Testing Connectivity

- Network Configuration
- Testing with Ping
  - Ping 127.0.0.1
  - Ping host IP address
  - Ping default gateway
  - Ping Internet Host

Troubleshooting Internet connection problems

- Defend the problem
- Gather the facts
- Consider and action plan
- Implement the plan
- Observe the results
- Document the results
- Introduce problems and troubleshoot

Network Math

Binary presentation of data

- The American Standard Code for Information (ASCII)
  - A = 01000001
  - B = 01000010
  - C = 01000011
  - ASCII code chart http://www.jbase.com/knowledgebase/manuals/3.0/30manpages/man/AsciiChart.htm

Bits and bytes

- 8 bits = 1 bytes

Lab and Homework

- Find out your machine network connectivity and configuration