



Advanced Data Training Module

- In this module you will learn:
 - Advanced network terminology
 - What an IP address is
 - What a MAC address is
 - How IP address work
 - How networks are defined



Network Terminology

- Port – This term has 2 common uses:
 1. It is often used to refer to the RJ45 jacks on a hub, switch, or router. (Example: Channel Vision sells a **5-port** switch.)
 2. In network terms, it is used to identify the destination of IP traffic from a single IP address.



Network Terminology

- Port – A number used to identify the destination of IP traffic from a single IP address. Source and destination ports are part of an IP packet.
 - Common Ports: HTTP-80, FTP-21, SMTP-25
 - Note: When a Web Camera Server is configured, the installer will need to forward port 80 to the Web Camera Server's private IP address. (more on this later).



Network Terminology

- DHCP – Dynamic Host Configuration Protocol. A technique to automatically provide IP address, default gateway, DNS servers, and other IP configuration information.
 - In typical data networks, routers use DHCP to automatically assign an IP address to the computers in the network. This makes networks very easy to setup.

Network Terminology

- NAT – Network Address Translation. Converting source private LAN IP address to public WAN IP address. Requires a dynamic table of source port numbers to help direct incoming IP traffic.
 - The table shown below is from the Channel Vision router (model C-0514).

ID	IP Address	Port/s	Data Type	Enable
1	192.168.2. <input type="text"/>	<input type="text"/>	TCP ▾	<input type="checkbox"/>
2	192.168.2. <input type="text"/>	<input type="text"/>	TCP ▾	<input type="checkbox"/>
3	192.168.2. <input type="text"/>	<input type="text"/>	TCP ▾	<input type="checkbox"/>

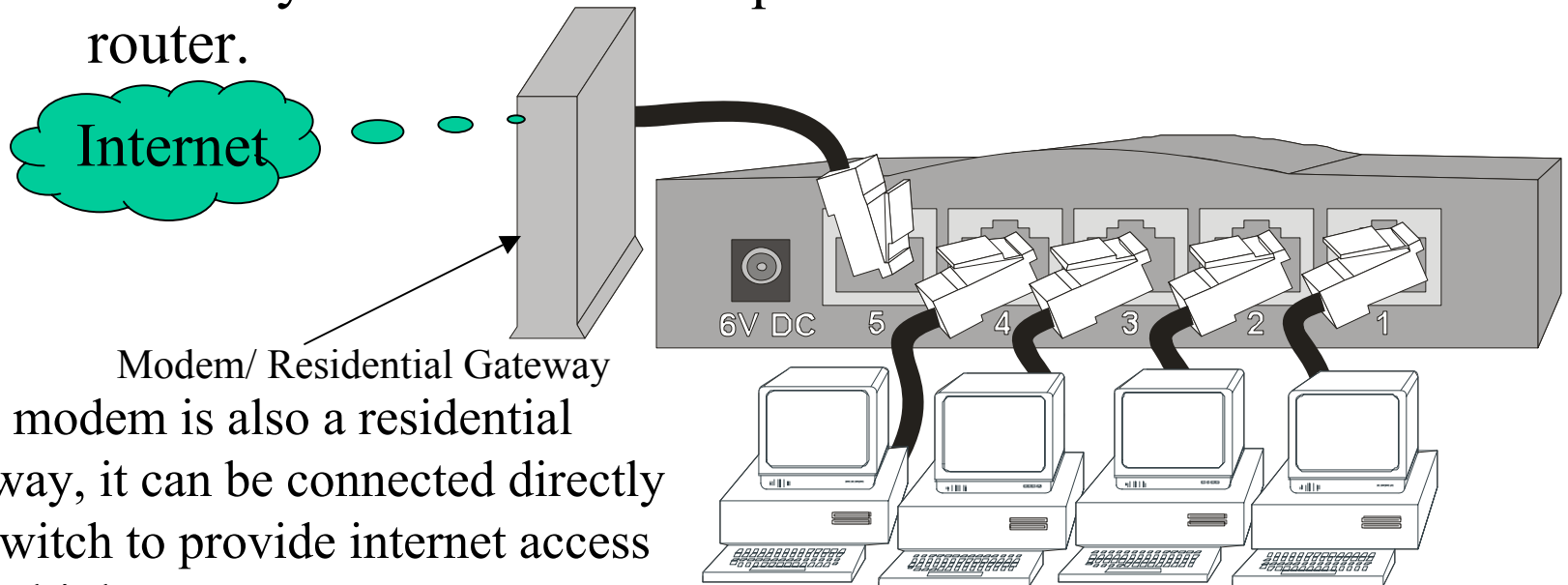


Network Terminology

- Router – Determines the next network point to which packet should be forwarded toward its destination. The router is connected to at least two networks and decides which way to send each information packet.
 - Think of a router as the mail room in a large office building which directs packages to the correct location.

Network Terminology

- Residential Gateway – Usually a router, DHCP server, and NAT. The term router and Residential Gateway are used interchangeably.
 - Some Cable and DSL modems are also Residential Gateways. These don't require the use of an additional router.



Modem/ Residential Gateway

If the modem is also a residential Gateway, it can be connected directly to a switch to provide internet access for multiple computers.

Network Terminology

- DNS – Domain Name System. A service that resolves names to IP addresses.
 - Every website on the internet is identified by an IP address, but to make the internet more user-friendly we use a Domain Name that forwards us to the correct IP address.

A DNS server translates these words into an IP address

such as:

64.105.132.249

Address



<http://www.channelvision.com/>

Note: the address shown above is just an example.

Network Terminology

- DNS example:
 - When we type: www.channelvision.com into our web browser, there is a Domain Name System server that directs us to IP address.
 - The Domain Name is much easier to remember.

A DNS server translates these words into an IP address

such as:

64.105.132.249



Address  http://www.channelvision.com/

Note: the address shown above is just an example.



Network Terminology

- Subnet Mask – A mask used to determine what subnet an IP address belongs to. Typical home networks have 254 valid IP addresses (0 and 255 are reserved). Therefore a typical subnet mask for a home network (Class C network) is 255.255.255.0.
 - Corporate networks (Class A or Class B) use subnets to help route IP traffic.
 - Subnet mask information is not necessary when DHCP is used



Network Terminology

- Think of the Subnet mask as an area code. If you dial the wrong area code, the call won't go through even if you dial the last seven numbers correctly.
- If you don't have the correct subnet mask, the IP address won't work.

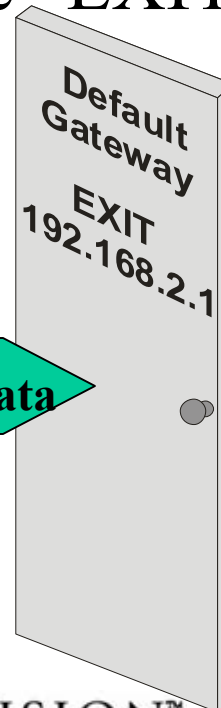
Network Terminology

- Default Gateway – This is the IP address of the router. Data must pass through this gateway in order to reach the internet.
 - This is the address of the “EXIT door”.

The Channel Vision router (model C-0514) uses 192.168.2.1 as the default gateway address.

Local Area Network

Outgoing Data



Internet

**Wide
Area
Network**



Network Terminology

- MAC address – Media Access Control address. Also known as the “physical address”, this is a permanent unique address that is assigned to every network device.
 - Unlike an IP address, a MAC address is assigned to a device at the factory and never changes.



Network Terminology

- IP address – a logical address that is assigned to a network device. This address can be changed to fit the logical scheme of the network.
- Example: 192.168.2.20
 - Note: most SOHO routers use a **Class C** IP addressing scheme like the one shown above.



IP Addresses

An IP address consists of 4 octets:

192.168.2.20

In a Class C address, the first 3 octets refer to the **network** and the 4th octet refers to the **host**.

Every device (or host) on a network must have the same network address (the first 3 octets must be the same).

Valid host addresses (the 4th octet) can range between 1-254, but no two hosts can have the same address.

Example:

192.168.2.20 192.168.2.123 192.168.2.254 192.168.2.256

Not a valid host address

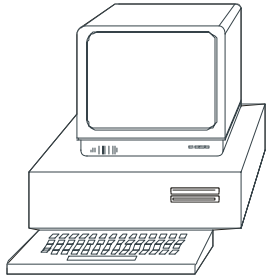
IP Addresses

- The router uses the network portion of the address (the first 3 octets) to determine which hosts are part of its network.

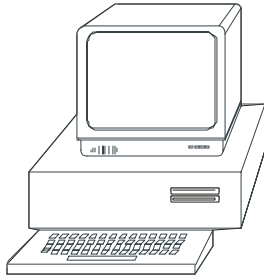
Example: Network address is 192.168.2.x

These computers will not be able to communicate with other computers on the network

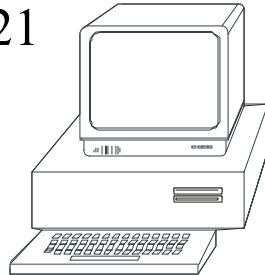
192.168.2.15



192.168.2.121



192.168.2.211



192.168.1.20



192.168.0.20





Assigning IP Addresses

- The easiest way to assign an IP address to computer is select “obtain automatically” in the computer’s TCP/IP settings.
 - This will allow the router to assign the IP address automatically using DHCP.
- For some devices, it is necessary to assign a *static* IP address that will not change.
 - Web Camera Servers should be assigned a *static* IP address.



Review

How are IP address different from MAC addresses?

MAC addresses are assigned at the factory and never change. IP addresses can be changed to conform to the network scheme.

How do static and dynamic IP addresses different?

Static IP addresses stay the same unless they changed by the network administrator. Dynamic IP addresses change automatically.

To which class does this IP address belong: 192.168.2.20?

Class C

What is the default subnet mask of a Class C address?

255.255.255.0



Review

What is the function of DHCP?

To automatically configure hosts (computers on the network) with IP, Subnet Mask, DNS, and Default Gateway information.

What device determines the Default Gateway address?

The router address is the Default Gateway address. The Default Gateway is the “Exit door” between the LAN and the WAN.

What is DNS and how does it work?

DNS is the Domain Name System. It is a system of servers that translates IP address to names like www.channelvision.com