**Networking 1A - LANs and WANs**

**LANs**

A LAN is a Local Area Network. It is a network that is owned and managed by a single business or school district, or even your own home network. All of the devices on the LAN can communicate without the need for an Internet connection.

**Rules for LANs**

1. Every device on the LAN must have a different ***IP address***.

2. Every IP address used on the LAN must be from the same Class A, B, or C network.

3. Every device on a LAN will have the same ***subnet mask***, which tells which parts of its IP address are "locked".

4. If the LAN is also going to have Internet connectivity, each device must be assigned a ***default gateway***, which is the IP address of the router that device must pass through to get onto the Internet.

5. We use ***switches*** as a means to connect multiple PCs, servers and other devices to one another and the router.

6. The devices on a LAN will connect to a router's FastEthernet interface.

**WANs**

A WAN is a Wide Area Network. It is a collection of inter-connected LANs. The most obvious example of a WAN is the Internet. WANs are not typically managed by a single company, but are instead shared amongst several groups.

**Rules for WANs**

1. We use routers to connect LANs to WANs.

2. To pass information from one LAN to another, we will utilize multiple routers.

3. Routers connect to other routers through serial interfaces. Each router to router connection is called a WAN link.

4. Serial interfaces will need IP addresses. Each WAN link is its own network and cannot overlap with other WAN links.

5. In each WAN link, one of the two sides must control the speed of the WAN link. This is called the clock rate.

6. In Packet Tracer, we can tell which side should be set with the clock rate by the "clock" symbol that appears when we mouse-over the serial connection between two routers.

7. In order for routers to learn about other networks that they are not connected to, we need a routing protocol.

8. We will use RIP as our first routing protocol. The routing protocol is used to advertise a router's directly connected networks to all other routers that are also running RIP. If all routers are configured with RIP and advertise all of their networks, all routers will learn about all other networks and all LANs in the topology will be able to communicate.