1 Introduction to Local Area Networks

1.1 What are networks?

That seems like an appropriate question to start with. Pretty much anything that's connected to anything else in some way can be described as a network. In this course, we'll be primarily concerned with Local Area Networks.

1.2 What are Local Area Networks?

Local Area Networks are generally networks that are limited to a relatively small area, such as a room, building, campus, etc. Larger networks are generally called "Metropolican Area Networks", or "Wide Area Networks".

The IEEE definition of a LAN is: *"A LAN is a data communication system allowing a number of independent devices to communicate directly with each other, within a moderately sized geographical area over a physical communication channel of moderate data rate."*

In short, a LAN is usually a fast small network.

It is important to realize that most of the higher level protocols used on LANs are exactly the same protocols that are used in most 'networks'. For example, you use TCP/IP on the Internet, and you'd also use it on a LAN.

2 LAN Components

A LAN is a combination of hardware and software.

2.1 The Hardware

The hardware consists of stations, transmission media, and connecting devices.

2.1.1 Stations

Stations are actual devices that connect to the network. These can be computers, printers, etc.

2.1.2 Transmission Media

The transmission media is the stuff through which signals travel. It can be *guided* as in the case of a wire, or *unguided* as in the case of air (wireless).

2.1.3 Connecting Devices

Besides the wires and stations, there are also connecting devices. There are two 'types':

1. Transceivers and all the other stuff that's used to connect a station to the medium.
2. Bridges, repeaters, etc., stuff that's used to connect segments of a LAN.

2.2 The Software

There are two primary categories of software, the Operating System, and Application Programs.

2.2.1 Network Operating System

There needs to be some software at the operating system level that manages the network connection. Most modern operating systems are capable of using the network.

2.2.2 Application Programs

The primary purpose of having a LAN is to allow several application programs to talk to each other.

3 LAN Models

There are several ways of organizing (or modeling) a LAN (or just about any other network). One way is to organize it as a Client/Server model, and another way is to organize it as a Peer-to-Peer model.

3.1 Client/Server

In client/server models, there are some stations which are called servers, and lots of other stations called clients. Normally, a client connects to a server to perform some service—such as printing, accessing a file, or send email, etc.

In a small network, there may only be one server that handles many services (for example, one computer on a LAN may act as a web-server, a print server, and a file server).

3.2 Peer-to-Peer

In a Peer-to-Peer model, no stations is specifically dedicated to be a client or a server. Each station can take on whatever role from time to time when needed.

4 LAN Applications

One obvious use for a LAN is in an office environment. A LAN allows folks to share resources, such as hardware (printing), software (running things off the network drive), sharing data (file servers), etc. LANs can also be used for user communication, and when hooked up to the Internet, users can access the Internet via their LAN.

Other uses for LANs include the manufacturing sector—where a central server can coordinate the activities of many factory machines, etc.

4.1 Backbone Networks

High speed LANs can be used to connect many slower networks together.