Data communications and neetworks essay sample

Signalling is a term used for the use of data being transmitted or carried across a medium for example in a network this could be a cat 5 cable. There has to be a way also for the receiver to interpret the data being sent and this is controlled by what's called " encoding" however the word " modulation" also means the same thing. The signal that is sent it modified in a way for it to signify data.

There are different types of transmission methods which differ from what type of medium you are using for example cables or wireless – there are four which are listed below:

1. Electrical – uses your cables to transport data between nodes

2. Radio Waves – this would be your wireless networks and could also include Bluetooth devices.

3. Light – this would use fibre optic cabling to send high speeds of data

4. Microwave

Analogue & Digital Signalling

There are two different types of signalling and these can be done in Analogue which means it changes all time in both amplitude and frequency. For example an analogue clock which has its hands moving all the time is changing the time all the time.

Whereas with digital signalling which are representations of discrete time signals. For example a digital clock shows the minutes and not the seconds.

When the information is being sent over a network when communicating, the information can travel in two forms, these are analogue and digital. The difference between the two is simple that analogue signalling never stops, and the information is being sent continuously, a good example of this signalling is clocks. An analogue clock will never stop, as the second hand is always ticking, therefore one can record an accurate reading of the time to the second, or even millisecond. For example, 1 hour 15 minutes and 24 seconds.

Appose this to digital signalling where one can not get an accurate reading of a clock as it will only show the minutes. And therefore is not continuous. This is because the data is consisting of separate states, which are on or off.

Sine Wave

This type of wave has two properties a Amplitude & Frequency, the amplitude represents the strength of the signal which would be the volume of a sound for example somebody talking. If the amplitude is stronger than it will travel further. The frequency of a Sine Wave is the rise and fall of the wave from the zero to the top and then back to the zero – this is known as a cycle and is measured in Hz. The higher frequency the more cycles and therefore the lower the frequency the lower the cycles.

Analogue

The image below shows the analogue type of signalling it’s constantly changing and represents all the values in the wave range, there is always a value in between a value and another.

http://moodle. derby-college. ac. uk/mod/resource/view. php? id= 2346

Digital

With digital signalling there are no in betweens like there in analogue its simply either 1 or 0, digital represents separate states and the change between these are practically unnoticeable.

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Asynchronous Transmission

Asynchronous transmission is when signals are not sent at regular intervals. A good example of this would be a user using a keyboard attached to a computer. The characters are sent irregularly however the bits must be sent at known intervals. This is done by having accurate clocks at both ends of the link. The receiving clock starts when it receives the first bit from the transmitter, this is also known as the start bit. The receiver then expects to receive a known number of bits every tick of the clock. When it has received these bits the clock may stop; the last bit is known as the stop bit.

Synchronous Transmission

However when large volumes of data are to be transferred, the waste of the stop and stop bits with every character means that asynchronous transmission is not an efficient method. With high-speed devices, and buffered low-speed devices, data can be transmitted in large, timed, synchronous blocks. The clocks, in the receiver and transmitter, are kept synchronised by sending regular groups of special characters called SYN

characters. Each time one of these groups is detected the receiver re-sets its clock, the data apart from this, it’s transmitted in exactly the same way as for asynchronous transmission. We can visualise the data as follows:

Bit Synchronisation

In a digital signal, as well as on occasion, an analogue one, all the different devices must know how often the signal varies along the transmission medium. For example, if the speed of the changes goes faster then the rate at which the device checks for changes, there will be a few of the bits missed between samples. If then sampling rate goes faster then the rate at which the transmission goes, the same bit will be used for a different sample a second time.

To combat this fact, the devices are made to a universal standard so that they can work together in harmony, and there are set systems in place to allow the data to be transferred correctly. A lot of the current technologies use asynchronous serial transmission. This transmission method is used when data is not sent at regular intervals, but the bits themselves have to be sent with regularity, some examples of these are keyboard, mice or even modems. During the spans of time that no signal is sent, the line or other medium is in what is called an idle state. This is defined by the constant 1 signal being sent.

One there is a packet of data that needs to be sent, for example, a key on the keyboard is pressed, the receiver first gets a start bit, a 0 state instead of a 1 to define the beginning of a piece of data now being sent to the

receiver, it is then sampled and at the end of the data transmission, the signal returns to the original constant 1 state.

Encoding Methods

Encoding simply means that the information is converted from one format to another format. This is a process that the data needs to have done to it before the computer can understand it and process it. There are different types of encoding which are

* Manchester

Encoding is a data communications line code which provides a way of encoding binary data sequences. Each bit is related to by at least one voltage level transition. Manchester encoding is said to be self clocking this means that synchronisation of a data stream is possible.

* Huffman

Encoding is another algorithm used for data compression; the coding uses a specific method for choosing the representation for each symbol.

* Unipolar Encoding

This type of encoding has 2 voltage states, one of these states is zero and because of this its also know as Return to Zero (RTZ) Unipolar encoding is used in computers & logic and an example of where its used in computers is the TTL logic.

* Polar Encoding

Polar encoding is when the digital encoding is on a level with zero volts for example the RS232 standard interface uses Polar encoding and unlike Unipolar the value doesn’t return to zero, its either a positive or negative voltage. With polar encoding it reduces most of the residual DC problem.