1. What is crosstalk? How is it minimized in case to twisted pair of wire?

Crosstalk is a situation in which signals from one copper cable cause electromagnetic interference in an adjacent cable. The interference from crosstalk can be minimized in a variety of ways (“crosstalk”, n.d.). First, twisting a pair of copper cables around each other reduces the interference. To further reduce interference, the cables can be sheathed in plastic and/or physically separated.

1. Why two separate frequencies are used for uplink and downlink transmission in case of satellite communication?

Satellites have different uplink and downlink frequencies in order to allow full-duplex transmissions. If the uplink and downlink were on the same frequencies, the only one direction could be transmitted at a time. By separating uplink and downlink, sending and receiving transmissions can happen simultaneously (Kalgalath, n.d.).

1. What is the inefficiency of Stop-and-Wait protocol? How is this overcome in sliding window protocol?

There are two methods for controlling data flow: Stop-and-Wait and Sliding Window. In the Stop-and-Wait method, the sender waits to send more packets until the receiver acknowledges receipt of previously sent packets. The main drawback is that Stop-and-Wait is a slow procedure where only one packet can be transmitted at a time. With sliding window protocol, a buffer is allocated on both the sending and receiving ends. The sender has a window of sequenced frames that it attempts to transmit. The receiver expects a window of frames and acknowledges them as they are received (David R K, n.d.).

1. Differentiate between the 2 switching techniques (Circuit Switching and Packet Switching).(4 differences)

Circuit Switching requires a physical path between the sender and reciever, whereas Packet Switching does not require a physical path being established. In Circuit Switching all of the packets are transmitted via the same pathway. This is not the case in Packet Switching: Packets can travel independently. Circuit Switching requires bandwidth be reserved in advance, which can lead to wasted bandwidth. On the other hand, Packet Switching has no wasted bandwidth because no bandwidth is reserved. Lastly, store and forward transmission is supported in Packet Switching but not in Circuit Switching. (Rajendra, 2012).

1. What is the difference between Error Detecting and Error Correcting Codes. How can Hamming Codes be used to correct burst errors?

When communication channels are unreliable, Error Detection and Error Correction codes can help. Error Detection Codes send additional information in the form of check bits to the receiver so that errors caused by noise can be detected by the receiver. Error Correction Codes go a step further: The additional information that they send allows the receiver to reconstruct the original message that was corrupted in transit (Thakur, n.d.).

Hamming Codes are an example of Error Correction Codes. In this scheme, each bit can be checked by the bits that correspond to the powers of 2 that the bit number itself can be written as a sum of. In this way, if there is an error in a data bit, multiple errors will be detected, but if there is an error in a check bit, only that one bit will be corrupted. In order to use Hamming Codes to check a burst of errors, several codewords can be sent. in a matrix block of data. In this way, if a block becomes corrupted, the codewords can be used to reconstruct the whole block of data (Humphrys, n.d.).

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