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Computer Networks

Assignment 04

**Prepare a of list of link layer protocols. Compare and contrast various link layer protocols.**

**List of Link layer protocols**

* Ethernet
* SDLC : Synchronous data link protocol.
* HDLC : High level data link protocol.
* SLIP : Serial line interface protocol.
* PPP : Point-to-point protocol.
* LCP : Link control protocol.
* LAP : Link access procedure.
* NCP : Network control protocol.
* CDP : Cisco discovery protocol
* FDDI : Fiber distributed data interface
* HDLC : High level data link control
* LLDP : Link layer discovery protocol
* SMLT : Split multi-link trunking
* UDLD : Unidirectional link detection
* ARP : Address resolution protocol.
* DCAP : Data link switching client access protocol.
* PAP : Password authentication protocol.
* STP : Spanning tree protocol.

**LLDP Link layer discovery protocol:** LLDP is standard protocol by IEEE used in switches to advertise to neighbors. By default, switch sends either CDP or LLDP advertisement. However, CDP is cisco proprietary protocol while LLDP is standard and can be used in any switch. The advertisement contains Type, length and value in the packet.

**CDP Cisco Discovery protocol:** Used to advertise to neighbors like LLDP, but it is specific to Cisco devices and is not installed/executed on other switches.

**SDLC Synchronous Data Link Protocol:** SDLC was developed by IBM in 1970s. It is used to connect the remote devices into mainframe computers. It usually supports multipoint links, error recovery and error detection also. It make sure that the data flows rightly and the data arrived is correct.

**HDLC High Level Data Link Protocol:** It was created and developed by ISO. It is based on SDLC and provides both reliable and unreliable services. HDLC is bit oriented and is applicable for both point-to-point and multipoint communications.

**SLIP Serial Line Interface Protocol:** It is used to add framing byte at the end of IP packet. It is a facility that is required to transfer IP packets among Internet Service Providers and home user over a dial up link. It does not provide error detection or correction facilities.

**PPP Point-to-Point Protocol:** used to provide similar facility as SLIP. It is most robust protocol and along with IP packets it transports other types of packets.It is used to transmit multiprotocol data between two directly connected computers. It is byte-oriented protocol that is widely used in broadband communication.

**LPC Link Control Protocol:** It was developed and created by IEEE. It is one of PPP protocol that is used for establishing, configuring, testing, maintaining and terminating links for transmission.

**LAP Link Access Procedure:** It is required for framing and transferring data across point-to-point networks. It also includes some reliability facilities.

**NCP Network Control Protocol:** It allows users to use computers and some other devices at remote locations. It is set of protocol that is forming a part of PPP.

**Research the Internet for new methods of error detection and correction at link layer. Describe at least one of them.**

**Some of commonly error detection techniques are**

* Parity check
* Checksum
* Cyclic redundancy check

**While some correction techniques involve**

* Backward error correction (Retransmission)
* Forward error correction

But a new and widely used technique called **Automatic repeat request ARQ** not only detects error but also corrects them by ACK or NAK response from the receiver. The sender makes a timer and retransmits the frames if it does not get ACK or NAK response from receiver, else in case of NAK it retransmits the frames simply. Further, ARQ merges the cyclic redundancy check and hamming code at same time and adds parity bits to transmitted data that the decoderuse and detect the errors. If the error is detected, it requests the data to be retransmitted. This is the continuous process until correct data is received.  In ARQ, the receiver does not attempt to correct the errors, but rather it sends an alert to the transmitter in order to inform it that an error was detected and that a retransmission is needed. This is called negative acknowledgement and the transmitter retransmits the data. If the data is correct, receiver sends acknowledgement to the transmitter. In case if ACK or NAK has not received in allotted time, the sender retransmits the data.

**The End**

**References**

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