How TCP/IP Works

In This Lecture

- Describe the layers of the TCP/IP protocol system and the purpose of each layer
- Describe the layers of the OSI protocol model and explain how the OSI layers relate to TCP/IP
- Explain TCP/IP protocol headers and how data is enclosed with header information at each layer of the protocol stack
- Name the data package at each layer of the TCP/IP stack
- Discuss the TCP, UDP, and IP protocols and how they work together to provide TCP/IP functionality

Responsibilities of a Protocol System

- Dividing messages into manageable chunks of data that will pass efficiently through the transmission medium.
- Interfacing with the network adapter hardware.
- Addressing—The sending computer must be capable of targeting data to a receiving computer. The receiving computer must be capable of recognizing a message that it is supposed to receive.

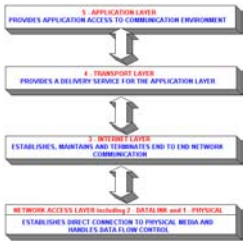
Responsibilities of a Protocol System

- Routing data to the subnet of the destination computer, even if the source subnet and the destination subnet are dissimilar physical networks.
- Performing error control, flow control, and acknowledgment: For reliable communication, the sending and receiving computers must be able to identify and correct faulty transmissions and control the flow of data.

Responsibilities of a Protocol System

- Accepting data from an application and passing it to the network.
- Receiving data from the network and passing it to an application.

TCP/IP Model

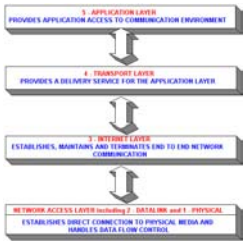


http://burks.brighton.ac.uk/burks/pcinfo/hardware/ethernet/tcpip.htm

Layer 5 – Application

- Gives an application access to the communication environment.
- Examples of protocols found at this layer:
  - Telnet, FTP (File Transfer Protocol), SNMP (Simple Network Management Protocol), HTTP (Hyper Text Transfer Protocol) and SMTP (Simple Mail Transfer Protocol).

TCP/IP Model



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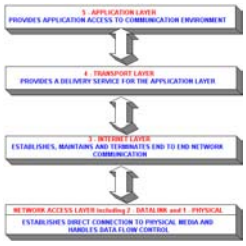
Layer 4 - Transport

- Provides an application layer delivery service.
- The two protocols found at the transport layer are TCP (Transmission Control Protocol) and UDP (User Datagram Protocol).
- Either of these protocols are used by the application layer process, the choice depends on the application's transmission reliability requirements.

TCP/IP Model



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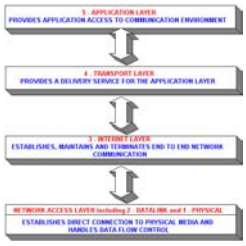
Layer 3 - Internet

- Responsible for the routing and delivery of data across networks.
- Allows communication across networks of the same and different types
- Carries out translations to deal with dissimilar data addressing schemes.
- IP (Internet Protocol) and ARP (Address Resolution Protocol) are both to be found at the Internet layer.

TCP/IP Model



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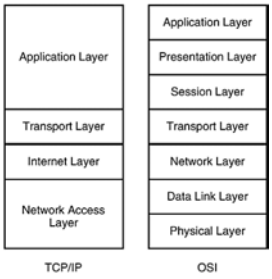
Layers 2 and 1

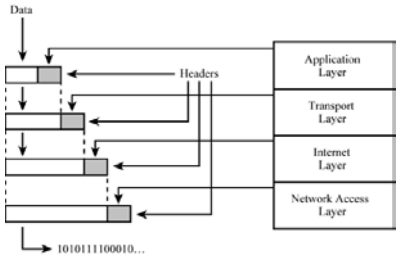
Network Access

- The combination of datalink and physical layers deals with pure hardware (wires, satellite links, network interface cards, etc.) and access methods such as CSMA/CD (carrier sensed multiple access with collision detection).

OSI Model



Data Packages



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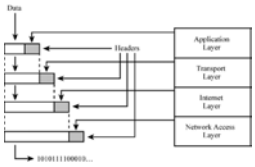
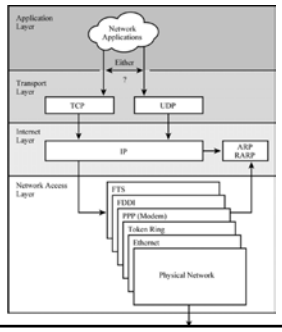


- Each Layer adds a header
- These headers are used by the corresponding layer.
- Information in the header can include:
  - To / from address info
  - Checksum
  - Number of characters

Data Packet Names

Application Layer	Data packets => "message"
Transport Layer	TCP/IP => "Segment" UDP => "datagram"
Internet Layer	"datagram"
Network Access Layer	Can subdivide datagrams "Frames"

TCP/IP Networking System



Bibliography

- "Teach Yourself TCP/IP in 24 Hours, Second Edition", Joe Casad, Sams Publishing, March 01, 2001
- http://burks.brighton.ac.uk/burks/pcinfo/hardware/ethernet/tcpip.htm, University of Brighton, Faculty of Information Technology, 8/24/2004