http://www.redbooks.ibm.com/redbooks/pdfs/gg243376.pdf

What is TCP/IP?

An acronym for a type of network model.

What is a network model?

An abstraction for describing a network communication system.

What other network models are there?

OSI

Why is the term TCP/IP coined? Aren't they two different concepts?

They are the two most important and first protocols in the internet protocol suite.

TCP/IP is often used to refer to the internet protocol suite itself

What is meant by the IP stack?

What is the purpose of TCP/IP?

To connect hosts on heterogeneous, dispersed networks.

Allows application-level components to use a common abstraction to underlying physical layers for host to host communication

What is meant by the Internet?

The interconnected network

Why the internet?

To allow remote hosts on different physical networks to communicate.

Is the Internet the same as an internet?

No. The Internet refers to the worldwide set of interconnected networks, whereas an internet is simply an interconnected network, which may or may not be connected to other networks.

What is a network?

A collection of physically separated hosts which are able to communicate with each other over communication channels.

Are there different types of networks?

Yes. Backbones, Regional networks, commercial networks, local networks.

What is the difference between a LAN and a WAN?

A LAN only spans a limited geographic area, whereas a WAN spans across geographic regions, metropolitan areas or nations.

What differentiates different networks?

The number of hosts that it can contain, the geographic distance that it can span.

What role does TCP/IP play in inter networking?

Abstracts away differences in the physical interfaces / communication mechanisms contained in different physical networks to allow them to communicate.

What is the OSI architecture?

A layered model established by the ISO comprised of an abstract layer-based networking model and a set of specific protocols.

How is OSI related to TCP/IP?

They are are two different models of the internet

How does OSI map to TCP/IP?

The tcp/ip application layer maps to the OSI application, presentation and most of the session layer

The tcp/ip transport layer maps to part of the OSI session layer and OSI transport layer

The tcp/ip internet layer maps to a subset of the OSI network layer

The tcp/ip link layer maps to part of the OSI network layer and the link and physical layers.

What is TCP?

Responsible for determining how data should be broken down and sent to the IP layer

What is the IP layer?

The layer of the network model responsible for routing, addressing

IP

Responsible for sending data from one host to another based on addresses.

Does IP support reliable, connection oriented delivery?

No. IP assumes higher level protocols will address issues such as reliability, ordering, and duplication.

What is a connection?

An end-to-end logical / physical pathway.

What is a connection-oriented protocol?

A protocol which establishes a communication session prior to sending data in the same order in which it was sent.

What is a communication session?

A representation of a dialogue between one or more communication devices / entities.

Can a session be stateless?

Yes

When is a stateless session used?

???

How is a session established?

In one of several ways.

In the application layer

In the session layer

In the transport layer

What is the difference between sessions started in different layers?

Sessions established at the application layer are typically only short lived or used where session-support is not available at lower-level layers, like UDP.

Examples of application layer sessions are HTTP and telnet

HTTP sessions are established by passing around a token or cookie

Sessions established at the transport layer are typically implemented by spawning a new thread or process for each session

A TCP session is synonymous with a socket, a TCP virtual circuit, or a TCP connection.

What is the difference between a TCP connection and a TCP virtual circuit?

With a TCP connection, a dedicated pathway is established per connection

Used in circuit-switching communication

With a virtual circuit, a virtual pathway is established by means of packet-mode communication.

What is packet-mode communication?

Communication in which transmitted data is grouped into groups of suitably sized blocks.

Block size is determined by network devices (adapters, switches and routers) based on current network congestion

Are there different modes of packet-switching communication?

Yes. The main ones are connectionless packet-switching and connection-oriented packet-switching

What is the difference between connection-oriented and connectionless packet-switching?

Connectionless packet-switching, each packet contains complete address / routing information, as each packet is routed differently, possibly by different paths and out of order.

In a connection-oriented mode, a connection is pre-allocated along each node in the path, with each packet associated with a connection identifier. Each packet is sent in order.

What is circuit switching communication?

Communication in which dedicated channels are established between endpoints such that QOS guarantees can be made

Examples of circuit switching communication are old analogue phone networks.

Delivery delay and latency is constant in a circuit switched network.

What are the differences between packet / circuit switching networks?

Packet switching networks introduce variable bit/rate throughput, in which QOS guarantees cannot be made

Circuit switched networks can provide QOS guarantees by virtue of the constant bit-speed possible with dedicated circuits

Packet switching networks move bits grouped within packets along paths shared with other traffic. Data is buffered within network nodes and forwarded using statistical multiplexing algorithms

Circuit switching networks reserve a route and bandwidth for the duration of a connection

Circuit switching networks can be considered innefficient since bandwidth and routes are guaranteed even when the circuit is not being used.

Circuit switching networks are valuable when constant throughput rates are required, as in voice communication or realtime-applications

Compare / contrast circuit switched networks and packet-switched virtual cirtuits?

Both guarantee bit ordering

Only circuit switched communication guaranteed QOS

Why connections?

To guarantee ordering

What is meant by a physical network?

Represented by the lowest layer of the OSI model.

Describe the physical layer of the OSE model.

Defines the means of transmitting raw bits, as opposed to logical data packets, over a physical link connecting network nodes.

Describes how bits are converted into a physical signal

What is meant by physical interfaces?

Each

Discuss fragmentation and the differences which may occur between how data is sent and how data is received?

in TCP/IP, data may be broken up into different sized packets by TCP. As such, the data a client receives may be received differently from how the data was originally sent.

To ensure the application layer receives information in a way it can understand, fragmented packets can be defragmented.

What is a transport protocol?

A protocol that provides various services involved in managing end-to-end communications

Responsible for delivering data to the correct application process on a host computer

How do different transport protocols differ?

In the services that they provide.

What services might a transport protocol provide?

Connection-oriented communication

Allows an application to treat data as a stream without having to worry about ordering

Byte orientation

Presents data to applications in the form of bytes

Reliability

Can verify data was received as it was sent by way of an ACK/NAK protocol.

Corrupted data can be handled by automatic retransmission.

What is an internetworking protocol?

A protocol responsible for datagram addressing, routing and addressing, dynamic address configuration, etc.

Huh?

Responsible for forwarding packets, including routing through intermediate routers.

Responsible for maintaining QOS where needed by directing data to the most efficient path

What is meant by quality of service?

The ability to guarantee a certain degree of performance.

How is QOS guaranteed in computer networking?

By a process of reserving resources

What are examples of QOS metrics?

bit-rate

delay

jitter

packet-drop probability

bit error-rate

When is QOS important?

When metrics such as delay and bit-rate are critical to application functionality, such as Voice-over IP and realtime-stream applications.

What is a data-link protocol / link layer?

Responsible for media-access control, flow control, and error checking.

Transfers data between network nodes on a WAN or nodes on a LAN.

Concerned with moving data.

Focussed on delivery between nodes on a LAN

Not focussed on routing of data between networks

Focussed on managing contention for acces to the physical network.

What is media access?

The process by which downstream data is written to a physical medium

Huh?

Hides the underlying physical network by creating a virtual network view.

Each host on the internet is assigned an address, or IP address

What is an IP address?

An addressible identifier for a host on the internet.

Consists of a network name and a host name

telnet

What is telnet

netcat

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