1.	**Host**	End systems/devices
2.	**Router**	Perform routing. Only have lower 3 layers of TCP/IP model
3.	**Switch**	Perform forwarding only. Only has lower 2 layers of TCP/IP model
4.	**Transmission Rate**	Link capacity, bandwidth
5.	**Internet**	Network of Networks
6.	**Protocols**	Control sending and receiving of messages (TCP, SMTP, IP, UDP, etc.). Define format, order of messages sent and received, and actions taken on message transmission and receipt.
7.	**Network Edge**	Hosts: Clients and servers
8.	**Access Networks, Physical Media**	Wired or wireless communication links
9.	**Network Core**	Interconnected routers
10.	**Packets**	Pieces of a fragmented message
11.	**L**	Length of packet in bits
12.	**R**	Transmission rate in bits/second

13.	**Guided vs Unguided media**	Guided: Signals propagate in solid media (copper, fiber, coax) Unguided: Signals propagate freely (radio)
14.	**PDU**	Protocol Data Unit, a header and data at one layer of a network stack
15.	**Packet switching**	Break data into packets without making reservation
16.	**Circuit Switching**	Send packet as one chunk, making reservation for path even if no data to be sent. Bad performance
17.	**Transmission Delay (Dtrans)**	Amount of time it takes to put whole packet on the link L/R
18.	**Propagation Delay (Dprop)**	Amount of time packet travels on the link distance/speed
19.	**N**	Number of links
20.	**p**	Number of packets
21.	**General formula for end-end delay**	N(Dtrans) + (p-1)Dtrans

		N(Dproc + Dtrans + Dprop)
22.	**Queuing Delay (Dqueue)**	Amount of time in the routers buffer before being sent on the link
23.	**Processing Delay (Dproc)**	Amount of time router takes to check packet for errors and where to send packet
24.	**Packet Loss**	Packets can be dropped if the routers buffer is already full and more packets arrive
25.	**Routing**	Determine source destination using header of packet
26.	**Forwarding**	Simply move packet from appropriate input to output
27.	**FDM**	Frequency-Division Multiplexing. Reserving frequency (bandwidth). Technique in circuit switching.
28.	**TDM**	Time Division Multiplexing. Reserving time (take turns). Technique in circuit switching.
29.	**IXP**	Internet Exchange Point; a meeting point where multiple ISPs can peer together

30.	**NEED**	formula for Dqueue, avg Dqueue, end to end
31.	**Throughput**	Rate (bits/time unit) which bits are transferred. Actual amount of data you can send or receive. Determined by smallest link. min{Rs, Rc, R/M}
32.	**Application Layer**	Service: Serve your apps Location: Inside the app Type: Software Data Called: Messages
33.	**Transport Layer**	Service: Provide virtual connection between apps Location: Inside the OS Type: Software Data Called: Segments
34.	**Network Layer**	Service: Create virtual connection between hosts Location: Inside the OS Type: Software Data Called: Datagrams
35.	**Link Layer**	Service: Send packet to next physical location Location: NIC Type: Software/Hardware Data Called: Frames
36.	**Physical Layer**	

	Service: Convert messages into bits Location: Cables Type: Hardware Data Called: Bits (?)
37. **Encapsulation**	Each layer encapsulates the one prior
38. **Server**	Always on host, permanent IP address, wait for request
39. **Client**	Host which communicates with server, initiate request
40. **3-Link Example**	Dend-to-end: L/R1 + L/R2 + L/R3 + d1/s1 + d2/s2 + d3/s3 + 2(Dproc) E.g. Add the transmission and propagation delays, add the processing delays for the 2 routers
41. **Ex: Suppose users share a 3 Mbps link. Suppose each user requires 150 kbps when transmitting, but each user only transmits 10% of the time. When circuit switching is used, how many users can be supported?**	3000000 bps / 120000 bps = 20 channels = 20 users
42. **Dqueue**	$((N-1)L)/2R$