OSI Layer	Responsibilities & Cisco Keywords	PDUs/ Encapsulation	Network Devices	Protocols & Standards
Application	Network & Application services Service availability	Data	Gateways	HTTP FTP TFTP TELNET SMTP LDP LDAP SNMP POP3 DNS (not inclusive)
Presentation	Data representation: E – encrypted T – transport C – compressed	Data		ASCII; EBCDIC (character set) MPEG; Quicktime (video compression) JPEG; TIFF; PICT (static image standards) MIDI (sound)
Session	Dialogue control of data flow Coordination of data flow 3 MODES: simplex half-duplex full-duplex	Data		NFS SQL RPC (remote procedure call) Xwindows (GUI for Linux) ASP NetBIOS (ways communication is controlled)
Transport	End-to-End communication • Non-acknowledge protocols • Acknowledge protocols 1. 3 way handshake 2. buffering 3. windowing 4. error detection 5. multicasting 6. flow control	Segment (ports are added)		TCP/UDP
Network	Routing happens here (path detection and determination) Logical addressing (IP addressing) Device location Fragmenting	Packet (IP addresses are added) source and destination	Router (to evaluate IP addresses)	ICMP (ping) IP IGRP (cisco proprietary) ARP; RARP; BootP; OSPF; DHCP; RIP (broadcast types protocols)
Data Link	Logical Link Control – multiple protocols w/ hardware independence (1 NIC) (TCP/IP; NetBUIE all on the same NIC card) Media Access Control (MAC): Media access Logical topology Error detection and flow control	Frame (MAC addresses are added) source and destination	Bridges Switches (to evaluate MAC addresses)	NDIS (windows) ODI (Novell) (NIC card driver standards) Ethernet Token Ring FDDI (network type standards)
Physical	Cables, connections, signals	Bits "1" and "0"	Hubs – no eval MODEMS Repeaters CSU/DSU	