CCNA Quick Reference

OSI Model

OSI Model
Application
Presentation
Session
Transport
Network
Data-Link
Physical

TCP/IP Model

TCP/IP Model
Application
Transport
Internetwork
Network Interface

OSI Model – Layer Examples

Layer	Examples
Application	Telnet, HTTP, FTP, WWW browsers, NFS, SMTP gateways, SNMP
Presentation	JPEG, ASCII, EBCDIC, TIFF, GIF, PICT, MPEG, MIDI, MP3, encryption
Session	RPC, SQL, NFS, NetBIOS names, AppleTalk ASP, DECnet SCP
Transport	TCP, UDP, SPX
Network	IP, IPX, AppleTalk DDP
Data-Link	IEEE 802.3/802.2, HDLC, Frame Relay, PPP, FDDI, ATM, IEEE 802.5/802.2
Physical	EIA/TIA-232, V.35, EIA/TIA-449, RJ-45, Ethernet, 802.3, 802.5, B8ZS

Network Numbers

Class	Network Bytes (Bits)	Host Bytes (Bits)	Addresses per Network
A	1 (8)	3 (24)	$2^{24}-2$
B	2 (16)	2 (16)	$2^{16}-2$
C	3 (24)	1 (8)	$2^{8}-2$

Valid Network Numbers

Class	IP Range	Number of Networks	Number of Hosts per Network
A	1.0.0.0 – 126.0.0.0	$2^{7}-2$	$2^{24}-2$
B	128.1.0.0 – 191.254.0.0	$2^{14}-2$	$2^{16}-2$
C	192.0.1.0 to 223.255.254.0	$2^{21}-2$	$2^{8}-2$

Private Network Numbers

IP Range	Number of Networks
10.0.0.0 - 10.255.255.255	1
172.16.0.0 – 172.31.255.255	16
192.168.0.0 – 192.168.255.255	256

Switch Trunking Protocols

	ISL	802.1Q
Standards Body	Cisco Proprietary	IEEE
Encapsulates Original Frame	Yes	No
Multiple Spanning Trees	Yes	No
Native VLAN	No	Yes

Configuration Register

0x2100	ROM monitor
0x2101	Boot from ROM
0x2102 – 0x210F	Boot system commands in NVRAM

IEEE Standards

Number	Name	Layer
802.1q	VLAN Trunking Protocol	Data-Link
802.2	LLC	
802.3	Ethernet (CSMA/CD)	MAC
802.3u	Fast Ethernet	
802.3z	Optical Gigabit	
802.3ab	Electrical Gigabit	
802.3ae	10 Gigabit	
802.5	Token Ring	
802.11	Wireless Networking	
802.11a	54 Mbps wireless	
802.11b	11 Mbps wireless	

WAN Data-Link Protocols

Protocol	Error Correction	Type Field	Other Attributes
Synchronous Data Link Control (SDLC)	Yes	No	Supports multiport links. Assumes the SNA header occurs after the SDLC header.
Link Access Procedure Balanced (LAPB)	Yes	No, except Cisco proprietary.	Used mainly with X.25
Link Access Procedure on D Channel (LAPD)	No	No	Used in ISDN lines for signaling to set up and bring down circuits.
Link Access Procedure for Frame Mode Bearer Services (LAPF)	No	Yes	Used over frame-relay links.
High-Level Data Link Control (HDLC)	No	No, except Cisco proprietary.	Cisco default on serial links.
Point-to-Point Protocol (PPP)	Supported, but not enabled by default.	Yes	Meant for multiprotocol interoperability.

WAN Speeds

Line Type	Signaling Type	Bit Rate
56	DS0 – 1 bit of 8	56 kbps
64	DS0	64 kbps
T1	DS1	1.544 Mbps (24 DS0s + 8 kbps overhead)
T3	DS3	44.736 Mbps (28 DS1s + management overhead)
E1	ZM	2.048 Mbps (32 DS0s)
E3	M3	34.064 Mbps (16 E1s + management overhead)
J1	Y1	2.048 Mbps (32 DS0s :: Japanese Standard)

ISDN Channels

	Bearer (B) Channels	Signaling (D) Channels
BRI	2	1 (16 kbps)
PRI (T1)	23	1 (64 kbps)
PRI (E1)	30	1 (64 kbps)

ISDN BRI Function Groups

Function Group	Full Name	Description
TE1	Terminal Equipment 1	ISDN-capable four-wire cable. Understands signaling and 2B+D. Uses an S reference point.
TE2	Terminal Equipment 2	Does not understand ISDN protocols & specifications. Uses an R reference point, typically an RS-232 or V.35 cable, to connect to a TA.
TA	Terminal Adapter	Uses R and S reference points. Paired with a TE2 to perform TE1 functionality.
NT1	Network Termination Type 1	CPE equipment in North America. Connects with a U reference point to the telco. Connects with T or S reference points to other CPE.
NT2	Network Termination Type 2	Equipment that uses a T reference point to the telco outside North America or to an NT1 inside North America. Uses an S reference point to connect to other CPE.
NT1/NT2	---	Combined NT1/NT2 on the same device. Common in North America

ISDN BRI Reference Points

Reference Point	What It Connects
R	TE2 & TA
S	TE1 or TA & NT2
T	NT2 & NT1
U	NT1 & telco
S/T	TE1 or TA to NT1 when no NT2 is used. Alternatively, connection from TE1 or TA to NT1/NT2

ISDN Protocols

Issue	Protocol	Examples
Telephone network & ISDN	E-series	E.163 - International telephone numbering plan E.164 – International ISDN addressing
ISDN concepts, aspects, & interfaces	I-series	I.100 series – Concepts, structures, & terminology I.400 series – User-Network Interface (UNI)
Switching & signaling	Q-series	Q.921 – Link Access Procedure on the D channel (LAPD) Q.931 – ISDN network layer

Ping Command Codes

!	ICMP Echo Reply Success
.	Timed Out
U	ICMP unreachable (destination)
N	ICMP unreachable (network)
P	ICMP unreachable (port)
Q	ICMP source quench
M	ICMP can't fragment
?	Unknown packet received

Routing Protocols

	RIP-1	RIP-2	IGRP	EIGRP	OSPF
Type	Distance Vector			Balanced Hybrid	Link State
Metric	Hop Count		Function of bandwidth & delay (default). Can include reliability, load, & MTU.	IGRP multiplied by 256	Cost (based on bandwidth)
Update Timer	30 seconds		90 seconds	NA	
Hold-down Timer	180		280		
Topology Table	No			NA	
VLSM Support	No	Yes	No	Yes	
Summarization Support					
Classless					
Infinite Metric	16		4,294,967,295	NA	

Distance Vector Protocols w/ Multiple Paths

Preventing routing loops due to updates passing each other over a single link.	Split Horizon – Routing updates not announced out interfaces on which they were received. Split Horizon w/ Poison Reverse – Split horizon rules unless route fails. On failure, infinite metric advertised out all interfaces.
Prevent routing loops due to alternate paths.	Route Poisoning – Subnet to a failed route is advertised with an infinite metric.
Counting to infinity.	Hold-down Timer – After a route fails, a router waits a given time period before accepting new information about the route. Triggered Updates – Info about failed routes sent immediately rather than waiting for regular updates.