Achievable

CCNA DUMP SHEET

Topologies, cabling, and cloud

Campus and SOHO designs

Design	Layers	Used in
SOHO	All-in-one router	Homes, small branches
Two-tier	Access, Distribution	Small to medium enterprises
Three-tier	Adds Core	Large campus, 3+ buildings

- **Access:** endpoints, servers, APs; no daisy-chained switches
- **Distribution:** paired Layer 3 switches; aggregation, policy
- **Core:** fast routing, few policies; avoids a distribution mesh
- **Collapsed core:** two-tier; distribution does the core's job

Data center and WAN

- **Spine-leaf:** each spine links to every leaf; servers on leafs
- **No links** spine to spine or leaf to leaf; any leaf is 2 hops away
- **Scales out:** add leafs for ports, spines for uplinks

WAN	Layout	Trade-off
Point-to-point	Two routers	Site to site
Hub-and-spoke	Sites through HQ	Low cost, added latency
Full mesh	Every site to all	Most redundancy, costly

- **Private WAN:** costly, guaranteed. **Public:** Internet, best effort

Copper Ethernet and PoE

Cable	Standard	Speed	Distance
Cat 5	100BASE-TX	100 Mbps	100 m (328 ft)
Cat 5e, Cat 6	1000BASE-T	1 Gbps	100 m (328 ft)
Cat 6a	10GBASE-T	10 Gbps	100 m (328 ft)

- **UTP** is the norm; **STP** adds shielding against EMI
- **Straight-through:** same pinout both ends, endpoint to switch
- **Crossover:** like devices; **Auto-MDIX** removes the need
- **PoE:** powers APs and IP phones; the switch must support it

802.3af	802.3at (PoE+)	802.3bt Type 3	802.3bt Type 4
15.4 W	30 W	60 W	90 W

Fiber Ethernet

Standard	Fiber	Speed	Distance
1000BASE-SX	Multimode	1 Gbps	550 m
1000BASE-LX	Single mode	1 Gbps	5 km
1000BASE-LX	Multimode	1 Gbps	550 m
10GBASE-SR	Multimode	10 Gbps	400 m
10GBASE-LR	Single mode	10 Gbps	10 km

- **S** is multimode only. **L** is long reach, on single mode
- **Jackets:** multimode orange or aqua, single mode yellow
- **Against copper:** longer reach, more bandwidth, no EMI
- **Two strands:** one transmits, one receives
- **Connector:** LC, into a hot-pluggable SFP transceiver

Interface and cable issues

Symptom	Means	Usual cause
Runts	Under 64 bytes	Faulty NIC, bad cable
Giants	Over 1518 bytes	Bad NIC, MTU mismatch
CRC, FCS errors	Bad frames	Noise, cabling, duplex mismatch

Symptom	Means	Usual cause
Collisions	Half duplex only	Duplex mismatch, bad cable
Late collisions	After 512 bits	Duplex mismatch, cable too long
I/O errors	Counters climb	Duplex mismatch, slow link

- **Duplex mismatch:** half side late collisions, full side CRC, runts
- **Speed mismatch:** the link does not come up
- **Auto vs. hard-set peer:** at 10/100 the auto side falls to half duplex
- **Fix:** auto on both ends, or the same manual setting on both
- **Shared media:** hub, half duplex, frames repeat out all other ports
- **Point-to-point:** a switch port to one device, full duplex

On-premises and cloud

Model	You run	Provider runs
On-prem	All of it, own site or a CoLo	Nothing
IaaS	OS and applications	Hardware
PaaS	Your applications	Hardware, platform
SaaS	Nothing	Everything

- **Private cloud:** your own data centers, delivered cloud-style
- **Hybrid cloud:** part public cloud, part on-prem

Virtualization

- **VM:** logical server with its own OS, on a slice of the hardware
- **Type 1 hypervisor:** on the hardware, direct access, faster
- **Type 2 hypervisor:** on top of an OS, convenient, limited
- **Virtual switch:** joins virtual NICs to the physical NIC
- **Container:** shares the host OS (Docker), lighter than a VM
- **VRF:** isolated routing table on a router; move interfaces in
- **Same VRF** routes directly; separate VRFs do not