Achievable

CCNA DUMP SHEET

NAT, DHCP, DNS, and NTP

NAT address names

Name	Address	Example
Inside local	Inside host's real IP	10.1.1.2
Inside global	Inside host after NAT	203.0.113.1
Outside global	Outside host's public IP	198.51.0.100
Outside local	Outside host, as inside sees it	172.16.1.250

- **Local:** as seen from inside. **Global:** as seen from outside

Three kinds of inside source NAT

Kind	Mapping	Notes
Static	1 to 1, fixed	Reachable from outside
Dynamic pool	1 to 1, from a pool	Pool empty: dropped
PAT (overload)	Many to 1, by port	Usual Internet access

- **Why:** private addresses aren't routed on the Internet
- **Out:** rewrites the source. **Back:** rewrites the destination

Configure and verify NAT

Command	What it does
`ip nat inside`, `ip nat outside`	Every kind. Interface mode: LAN side, then Internet side
`ip access-list standard LAN`, `permit 10.1.1.0 0.0.0.255`	Pool and PAT: sources to translate. Static needs no ACL
`ip nat inside source static 172.16.1.250 203.0.113.250`	Static: inside local IP, then inside global IP
`ip nat pool POOL1 203.0.113.2 203.0.113.9 netmask 255.255.255.0`	Names the pool: first IP, last IP, mask
`ip nat inside source list LAN pool POOL1`	Dynamic pool. Add `overload` for PAT on the pool
`ip nat inside source list LAN interface g0/1 overload`	PAT on the outside interface's IP
`show ip nat translations`	Inside global, Inside local, Outside local, Outside global
`show ip nat statistics`	Hits, misses, and which interfaces are inside and outside
`clear ip nat translation *`	Clears dynamic entries. Privileged EXEC

DHCP: D.O.R.A.

Message	From	Sent as	Carries
Discover	Client	Broadcast	Source 0.0.0.0
Offer	Server	Unicast/broadcast	IP, mask, gateway, DNS
Request	Client	Broadcast	Accepts one offer
Ack	Server	Unicast/broadcast	Confirms the lease

Command	What it does
`ip helper-address 172.16.1.250`	Relay. Interface mode
`ip address dhcp`	Client. Interface mode
`show ip interface g0/0`	Shows the helper address
`show dhcp lease`	Shows the client's lease

- **Role:** leases IP settings for a set time. UDP 67, 68
- **Why relay:** routers don't forward broadcasts
- **Helper:** on the interface facing the *clients*, naming the *server*
- **Pool:** the server picks it from the relay's client-side IP
- **Duplicate check:** server pings first; client ARPs after the Ack

NTP: UDP 123

Stratum	Meaning. Lower is more accurate
0	Reference clock: atomic, GPS
1	Takes time directly from stratum 0
2-15	Each hop adds 1. Client = server + 1
16	Unsynchronized: a Cisco router's default

Command	What it does
`clock set 12:30:00 1 May 2026`	*Privileged EXEC*
`clock timezone EST -5`	Global config
`ntp master 2`	Server at stratum 2
`ntp server 10.1.1.1`	Client of 10.1.1.1
`show ntp status`	Sync, stratum, reference
`show ntp associations`	`*`: synced to this peer

- **Bare:** `ntp master` is stratum 8. Set the clock first
- **Verify clock:** `show clock`. `*` not authoritative, `.` lost its NTP server, no mark: synced or set by hand

DNS

- **Role:** name to IP, as ARP is IP to MAC. UDP, TCP 53
- **A host needs:** IP, subnet mask, default gateway, DNS server
- **Records:** A IPv4, AAAA IPv6, CNAME alias, MX mail, PTR reverse
- **DNS server's IP:** by hand or DHCP. **Down:** sites load by IP only