ping, traceroute and mtr testing

Network path

CONCEPTS

ping tests the round trip to one host; traceroute and mtr find where along the path it breaks or slows.

TTL 1 router 1 replies
↓ TTL+1
TTL 2 router 2 replies
↓ TTL+1
TTL n last router
↓ reaches
Target final reply

Probes with rising TTL; each router answers with ICMP Time Exceeded

Many routers rate-limit or drop probe replies, so loss on one hop that does not continue to later hops is usually harmless.

PING BASICS

`ping <host>`
Ping until interrupted (Ctrl+C)

`ping -c <count> <host>`
Stop after <count> replies

`ping -4 <host>`
Use IPv4 only

`ping -6 <host>`
Use IPv6 only

`ping -i <seconds> <host>`
Wait between packets

`ping -s <bytes> <host>`
Set payload size (default 56)

READING PING

Output fields

Field	Means
`icmp_seq`	Packet number; gaps mean loss
`ttl`	Remaining hops on the reply
`time`	Round-trip time in ms
`% packet loss`	Share of requests unanswered
`rtt min/avg/max/mdev`	Latency summary and jitter

TRACEROUTE

`traceroute <host>`
Trace the path (UDP probes)

`traceroute -n <host>`
Do not resolve names

`traceroute -I <host>`
Probe with ICMP echo

Reading hop lines

Shown	Means
`* * *`	No answer; filtered or rate-limited
`three times`	RTT of each of the 3 probes
`!H / !N / !X`	Host, network or admin unreachable
`different IPs on a hop`	Load-balanced paths

MTR LIVE VIEW

`mtr <host>`
Live trace with loss and latency

`mtr -n <host>`
Show IPs only, no DNS

MTR REPORT AND PROTOCOLS

`mtr -r -c <count> <host>`
Report mode: run, print, exit

`mtr -rw -c <count> <host>`
Wide report, full hostnames

`mtr -T -P <port> <host>`
TCP SYN trace to a port

Report columns

Column	Means
`Loss%`	Share of probes lost at this hop
`Snt`	Probes sent
`Last`	Latest RTT in ms
`Avg`	Mean RTT
`Best / Wrst`	Fastest / slowest RTT
`StDev`	Spread of RTT; high means jitter

Judge loss by the last hops: loss that appears at one hop and disappears further on is rate limiting; loss that continues to the target is real.