

P I N G

Ping—command line utility in Cisco's IOS and most host operating systems (Windows, Unix, etc.) to send ICMP echo-requests to an IP address.

On IOS, it sends 5 requests with a 2 second timeout, each. Fails show a period (.) on the screen, successes an exclamation point (!). It's common for the first one to time out when an ARP is required.

ICMP (Internet Control Message Protocol)—An L₄ protocol (doesn't use TCP or UDP).

Strategy—get close to the client's problem machine and ping from there. If you're on the router that the host uses as a default gateway, you can use an extended ping to force replies to be routed all the way to the host's subnet. Pinging other hosts on the same subnet can narrow the problem.

Extended Ping—Just issue a ping command with no address. It'll interrogate you for options. If a standard ping to the host from its router works but an extended ping from the "far side" of the router (IP of a different interface) doesn't, look at the default router config on the host.

Successful pings confirm

- Unicast routability
- Delivery of packets and frames (L₃ & L₂)
- ARP resolution
- Almost certainly a switch learned the MAC addresses of both end devices.

Even if pings work, the host could still face problems from

- Port security on the access switchport
- ACLs that block the host's IP address (but not the router's)
- Routes that match the host's IP address, but not the router's
- Wrong default gateway on the host

Failure could indicate

- Wrong static IP configured
- Bad DHCP config—lots of options here: wrong network statement, default-router, missing relay, host never got its lease, etc.
- VLAN trunking problem (encapsulation mismatch on switch and router (one trunks), etc.)
- Almost any LAN problem

Pinging a hostname tests

- Your DNS config
- Connectivity to, and functioning of, your DNS server

T R A C E R O U T E

Traceroute—tells how far a ping is routed before failing. Traceroute deliberately generates pings that will die partway and listens for the error messages. Each router that reports an error is one more hop toward the destination.

TTL (Time To Live)—A counter in IP packet headers that is decremented every time the packet passes through a router. When the counter hits 0, the packet is dropped. Setting this value in the ping allows traceroute to step through a packet's path. (e.g set it to die in two hops and wait to see which router reports the death).

Extended traceroute—offers many of the same options and benefits of the extended ping.

On Windows, it can be called "tracert" or "pathping."

When a traceroute fails,

- Connect to the last successful router and check for forward routing problems
- Connect to what should have been the next router and check for reverse routing problems—remember, the answer needs to get back.

T E L N E T A N D S S H

If your routing doesn't work, you can still telnet/ssh one hop at a time (they're all locally connected) to get where you're going.

```
R# telnet 10.0.0.1
```

Technically, you didn't even need the keyword "telnet."

```
R# ssh -l fred 10.0.0.1
```

The optional lowercase L tells it what login account to use

To leave a telnet or ssh session, just say "exit" or "quit."