

DHCP vs. DNS: Find the First Failed Dependency

Recommended time: 45-60 minutes | Focus: Address configuration, name resolution, dependency-chain troubleshooting

Learning Objectives

1. Distinguish DHCP configuration failures from DNS failures.
2. Identify what successful IP configuration does and does not prove.
3. Locate the first failed or unresolved dependency from evidence.
4. Avoid changing a subsystem whose checkpoint is already proven.

Teacher design rule: Require a prediction before configuration and an explanation after verification. A working fix without supported reasoning is still useful formative-assessment evidence.

Warm-Up

Ask: What question does DHCP help answer? What question does DNS help answer?

DHCP can provide host configuration such as address, prefix, gateway, and DNS server. DNS resolves names to addresses and other records.

Case A - Self-Assigned Address

Client shows 169.254.21.80, no useful default gateway, and no expected DNS configuration.

Interpretation: the client likely did not obtain expected IPv4 configuration. Next evidence should focus on DHCP client state, DHCP availability, VLAN path, or relay behavior.

Case B - Valid IP, DNS Failure

Client: 10.20.4.25/24; gateway 10.20.4.1; DNS 10.20.1.53. Gateway ping succeeds. Remote numeric IP succeeds. DNS query times out.

Interpretation: local and remote IP reachability are supported. Name resolution is the first failed checkpoint shown.

Case C - DNS Works, HTTPS Fails

DNS returns the expected server address, but TCP/443 times out.

Changing DNS is unsupported by the evidence. Investigate transport reachability, policy, server listener, return path, TLS, or application behavior.

Student Artifact

Create a chain: Addressing → Gateway → Remote IP → DNS → TCP Port → Application. Mark every stage PROVEN, FAILED, or UNRESOLVED for each case.

Control / Falsifying Test

For Case C, test another known-good service or another client using the same server. Ask which hypotheses each result would weaken or strengthen.

Exit Ticket

A client has a valid DHCP lease, reaches the gateway, reaches a remote numeric IP, receives the expected DNS answer, and the browser still times out. Which systems should not be the first target?

Answer: DHCP and DNS are already supported by the evidence.

Quick Assessment Rubric

Criterion	Strong Evidence
Prediction	States the expected network behavior or artifact before the change.
Interpretation	Explains what the evidence proves and what remains unresolved.
Decision	Changes only what the evidence supports.
Verification	Repeats the original test and includes a control or negative test when appropriate.

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