

HOW DOES THE INTERNET GET FROM HERE TO THERE?

From one browser tap to a world of devices, networks, routers, and servers.

EXPLORER

BUILDER

ENGINEER / RESEARCHER

**YOUR DEVICE → LOCAL NETWORK → ISP → OTHER NETWORKS →
WEBSITE / SERVICE**

WHAT YOU NEED

Paper and a pencil. A phone is optional. No login, downloads, or new equipment.

WHAT YOU WILL MAKE

A labeled route map and a simple packet-delivery experiment you can explain to a friend.

One familiar action; many connected systems. Learn it without needing a computer.

How to use this public lesson

Complete every step independently, or pause and discuss as a group.

EXPLORER

Explain what the internet does and draw how one website reaches a phone.

BUILDER

Simulate packet routes, spot a failure, and design a more resilient path.

ENGINEER / RESEARCHER

Question addressing, forwarding tables, caching, route changes, and measurement.

STOP / DRAW / TEST whenever a challenge appears. A successful lesson produces an answer, an artifact, a next step, or a better question.

No age gate, technical prerequisites, or paid equipment. Continue at your own pace.

Five weeks, one connected story

Each Thursday increases the resolution of a familiar technology experience.

1 WEEK 1

Technology is a system, not a screen.

2 WEEK 2

A tap travels from input to feedback.

3 WEEK 3

Performance shapes human experience.

4 WEEK 4

Hardware and software cooperate inside a device.

5 WEEK 5

Networks connect devices to services beyond them.

Today: follow the data outside the device and back again.

A normal moment: open a website

Imagine entering gunnchos.com in a browser. You expect a page, not a lesson in networking.

WHAT YOU NOTICE

1. You type a readable name.
2. The browser begins loading.
3. Text and images appear.
4. You can interact with the page.

WHAT MUST EXIST

Your device + a local connection + a way to find the site + networks that can forward data + a service that responds + software that renders the result.

Guiding question: how do little pieces of information find the right destination?

The internet is not the same as the web

The internet carries many kinds of communication. The web is one service built on it.

INTERNET = INFRASTRUCTURE

A worldwide network of networks: connected devices and systems exchanging data using common protocols.

WEB = ONE APPLICATION FAMILY

Web browsers use web protocols (like HTTP/HTTPS) to request pages and resources. Email, games, and calls also use the internet.

The web uses the internet; not everything on the internet is a web page.

Quick check: is a video call over the internet necessarily “the web”? No.

The route at a glance

This is a conceptual map; real routes and service locations vary.



The information also needs a route back. Requests and responses may traverse different paths.

A local Wi-Fi connection does not by itself guarantee access to the internet.

Client asks. Server or service responds.

A browser is a client when requesting web content. A website may depend on many services.

CLIENT: MAKES A REQUEST

“Please send the resource at this web address.”

Example: browser on a phone.

REQUEST

SERVER / SERVICE: ANSWERS

Receives a request and returns data or an error. Content may come from nearby caches.

RESPONSE

Websites often include several requests for images, styles, scripts, and data.

Before the internet: the local network

Wi-Fi connects you to a local access point. Another connection carries traffic farther.

PHONE / LAPTOP

Runs the browser and joins Wi-Fi or a mobile network.

ACCESS POINT / ROUTER

Connects local devices. A home box may combine Wi-Fi, routing, switching, and modem functions.

PROVIDER CONNECTION

A cable, fiber, cellular, fixed wireless or other access path reaches a network provider.

Try asking: what can still work locally if your internet service is down?

The internet is a network of networks

Your provider connects to other networks; no single router holds the entire internet.

YOUR NETWORK

A home, school, business, or mobile network.

ISP

An internet service provider moves traffic onward.

OTHER NETWORKS

Transit networks, peers, content providers, and CDNs.

DESTINATION SERVICE

The endpoint or cache that returns the resource.

The internet is cooperative routing between independently operated networks.

Names, addresses, and destinations

Humans remember names. Networks forward packets toward IP destinations.

DOMAIN NAME

gunnchos.com

A human-friendly name. It can map to different addresses over time or location.

DNS LOOKUP

Domain Name System (DNS) helps find the addresses a service advertises.

IP ADDRESS

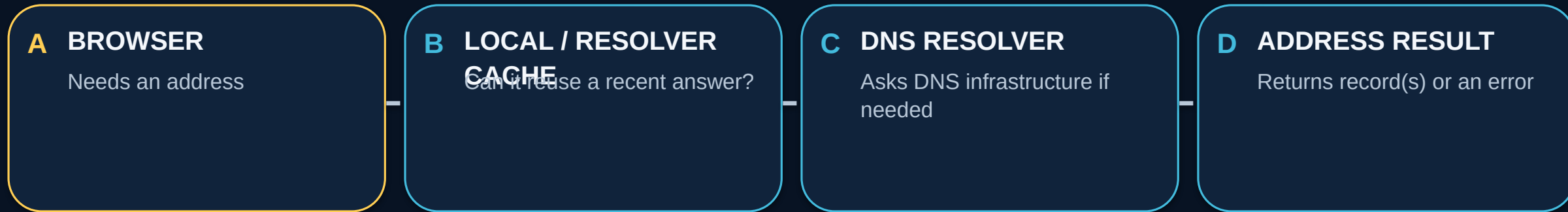
A numerical network-layer address used for routing, such as 203.0.113.7*

*203.0.113.7 is an example-only documentation address, NOT the real IP of gunnchos.com.

DNS is an address lookup, not the act of downloading the web page.

How DNS helps find a site

Commonly, a cached answer is used; otherwise a resolver looks up the answer.



A cached answer may skip additional lookups. DNS answers can change and may list multiple addresses.

Different task: “find the address” vs “contact the service.”

Packets: data travels in manageable pieces

An application can transfer data as many network packets, not one giant message.

REQUEST / RESPONSE DATA

PACKET A

address + content

PACKET B

address + content

PACKET C

address + content

PACKET D

address + content

Packets carry addressing and control information, along with some of the data.

Do packets arrive perfectly? Not always.

Networks can delay, drop, or deliver packets out of order; the application uses suitable protocols to cope.

ADDRESSING

An IP destination tells routers where a packet should be forwarded.

FORWARDING

Each router selects a next hop using its routing/forwarding information.

DELIVERY RECOVERY

Protocols and applications determine how missing or out-of-order data is handled.

Packet paths may differ. Reassembly and reliability depend on transport/application behavior.

What does a router actually do?

Think “Which neighbor should receive this packet next?” rather than a global GPS map.

INPUT

Packet arrives with a destination IP address.

DECISION

Forwarding table chooses a next hop or an outgoing interface.

OUTPUT

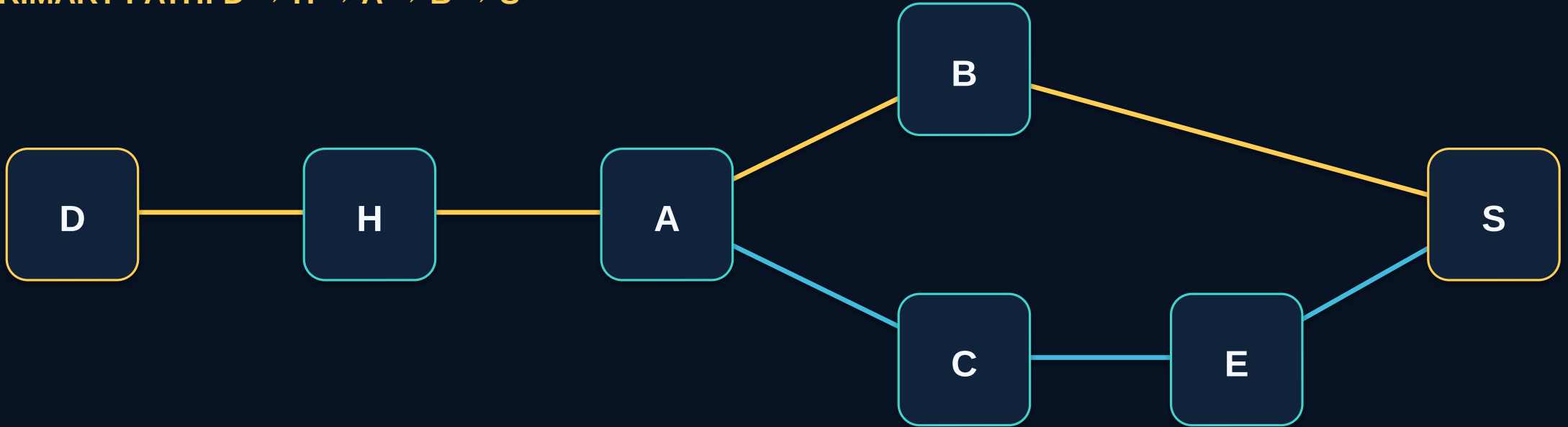
The router forwards, or may discard it when forwarding is not possible.

Routers usually decide the NEXT STEP, not the entire end-to-end route.

One destination, more than one possible path

A simplified teaching network shows why alternative routes can matter.

PRIMARY PATH: D → H → A → B → S



ALTERNATE: D → H → A → C → E → S

Route changes are possible, not automatic or immediate: policies and available paths matter.

HTTP: asking for a resource

The browser asks a service for a page or asset and interprets what comes back.

1. REQUEST

A web client requests a resource by URL and method, often GET.

2. RESPONSE

A server, CDN, or service sends a status and content or error.

3. RENDER

The browser processes HTML, styles, scripts, images, and more.

Web protocols evolve: HTTP/1.1 and HTTP/2 commonly use TCP; HTTP/3 uses QUIC.

HTTPS: protect what travels

HTTPS usually encrypts communication between the client and the authenticated endpoint.

WHAT IT HELPS WITH

Encryption and integrity protect content in transit from many on-path observers. Certificate checks help authenticate the server connection.

WHAT IT DOES NOT GUARANTEE

A site can still be malicious, a password can still be stolen by scams, and some connection metadata may remain observable.

Good habit: check the address, avoid sharing passwords, and never post private account details.

The whole web journey, in seven moves

This is a conceptual common case; some steps may use cache or differ by protocol.

1 TYPE NAME

2 FIND ADDRESS

3 CONNECT

4 SEND REQUEST

5 ROUTE PACKETS

6 GET RESPONSE

7 DISPLAY

A page may need several requests and components. It might be served from a nearby cache.

When it fails, ask **WHERE** in the journey

Different symptoms are clues, not proofs of a specific cause.

Wi-Fi connected, pages never load

Could be gateway / DNS / ISP / remote service.

One website fails; others work

Could be site, DNS entry, account, or browser issue.

Some pages load, others are slow

Could be large assets, congestion, caching, or device limits.

A video call freezes; email works

Could be real-time sensitivity, jitter, loss, or app behavior.

Observe → locate → test → learn. Do not jump from symptom to certainty.

Your hands-on task: deliver three packets

You can complete this entire activity with pencil and paper in 10 minutes.

WHAT TO DRAW

Copy the network on the next slide. Make three little paper messages: P1, P2, P3. Give them a source D and destination S.

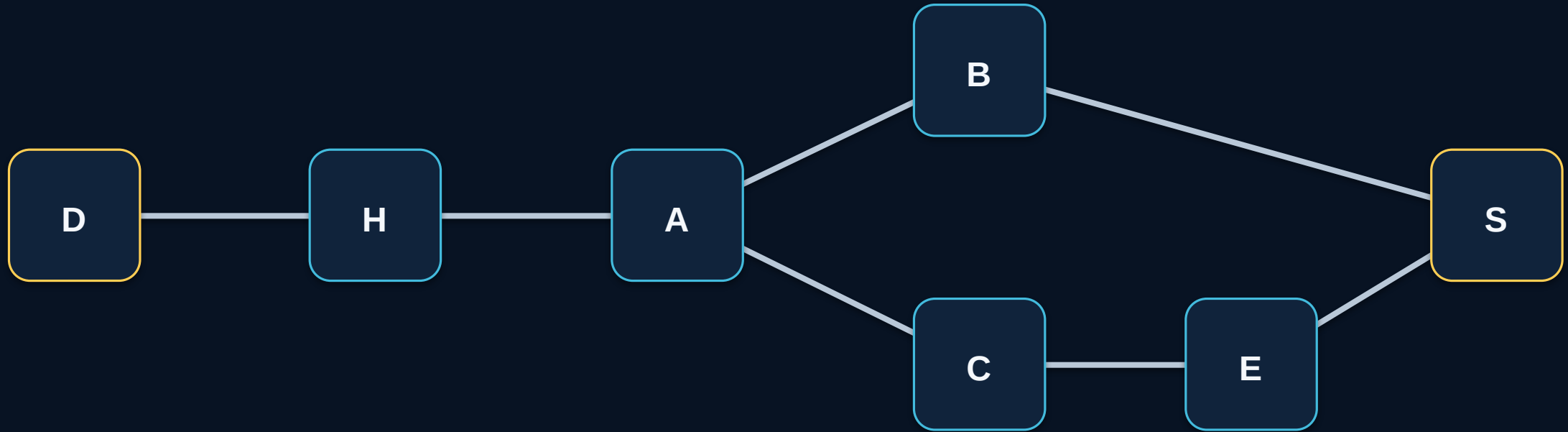
RULES

Move a packet only along drawn links. Use route D–H–A–B–S while B works. Later, pretend B fails. Find another available path.

WRITE DOWN: which routers were visited, number of links, and what you changed.

Copy this network onto paper

D = Device • H = Home router • A/B/C/E = Routers • S = Service



Goal: get P1, P2 and P3 from D to S; do not jump between unconnected nodes.

Round 1: everything works

Use the shorter illustrated route for packet P1.

DO THIS

1. Start P1 at D.
2. Move to H, then A.
3. Continue through B to S.
4. Write the full route and count the links.

CHECK BEFORE MOVING ON

Did P1 reach S?

Which nodes did it visit?

How many links did it cross?

What does a router need to decide at A?

PAUSE: write your route before looking at the worked answer.

Round 2: imagine router B goes offline

Route P2 and P3 without visiting B.

CHALLENGE

Cross out B and its connected links. Find another valid D-to-S route. Draw new arrows and count how many links it uses.

DISCUSS

Does another path exist?

Does every real network switch instantly?

What should users see if rerouting causes a delay?

Engineering idea: a backup path helps only if the network knows to use it.

Worked solution: the path can change

Fictitious paths illustrate a principle; they are not measured internet routes.

ROUND 1: B AVAILABLE

$D \rightarrow H \rightarrow A \rightarrow B \rightarrow S$

Four links. The packet follows the illustrated primary route.

ROUND 2: B FAILED

$D \rightarrow H \rightarrow A \rightarrow C \rightarrow E \rightarrow S$

Five links. This alternate route avoids B in the exercise.

Lesson: alternate paths can improve resilience, but may add delay or complexity.

Observe your network without taking risks

A phone is optional. Do not publish addresses, passwords, Wi-Fi details, or other private information.

1. LOOK

Open your phone's Wi-Fi or cellular settings. Are you using a local Wi-Fi access point or cellular data?

2. NOTICE

While on Wi-Fi, try a harmless public webpage. Does it load? Can you tell from this alone where a failure might be?

3. RECORD

Write observations, not account details. Example: "Connected to Wi-Fi; public site loads slowly."

Do not change school/work network settings or run network scans without authorization.

Design more reliable access for a community library

The goal is a usable learning experience, not merely a glowing Wi-Fi icon.

THE PROBLEM

The library has Wi-Fi, but learners report slow pages and occasional outages during busy hours. Devices vary and some learners use phones only.

YOUR DESIGN

Draw device → Wi-Fi → gateway → ISP → service. Mark three possible failure points. Propose one low-cost improvement and one way to test it.

What evidence would help distinguish coverage, capacity, DNS, and remote-site problems?

Increase the resolution: five deeper questions

Advanced options support deeper inquiry without being prerequisites for beginners.

1 DNS CACHE

When can a cached answer help? When might it become stale?

2 ROUTING POLICY

How do networks choose next hops and respond to failures?

3 TRANSPORT

When do TCP and QUIC differ? What reliability do they provide?

4 MEASUREMENT

What can ping or traceroute reveal—and what can't they prove?

5 SECURITY / PRIVACY

What does HTTPS protect? What metadata or threats remain?

State your assumption, define an observation, test, and report limitations.

Four questions to test your map

Try your answers BEFORE moving to the next slide.

1. Is Wi-Fi access exactly the same as internet access?

2. Does DNS download a webpage, or help find an address?

3. What is a router's immediate forwarding decision?

4. If a route fails, will every packet instantly find a new route?

Pause and answer in your own words. You need no special terminology.

Answers: follow the evidence

An explanation is more important than memorizing a definition.

1 1. NO

Wi-Fi connects local devices. The gateway or provider can still be unavailable.

2 2. ADDRESS

DNS helps resolve names to DNS records such as IP addresses; HTTP fetches resources.

3 3. NEXT HOP

A router uses destination information and a forwarding table to choose where to send a packet next.

4 4. NO GUARANTEE

An alternate path, routing state, and sufficient time are needed; some traffic may fail.

You now have a route map, a failure scenario, and an evidence-based explanation.

One webpage. Many networks. One human experience.

Use the five questions below whenever a digital experience breaks or surprises you.

WHO?

Which device or client
is asking?

WHERE?

What address or
service is being
contacted?

HOW?

Which local and
provider networks
carry the data?

WHAT?

What request and
response travel?

WHY NOT?

Which boundary may
be failing or slow?

NEXT WEEK / NOV 5: How does AI actually produce an answer?

Read, build, and share the route map

Free public links. Illustrative diagrams; actual network paths and services differ.

gunnchOS3k / PROGRAM<https://gunnchos.com>**WAIKE / LEARNING PATHS**<https://github.com/gunnchOS3k/waike-research-ops>**THE TECHNOLOGY LANDSCAPE**<https://github.com/gunnchOS3k/gunnchos-technology-landscape>**MDN / HOW THE INTERNET WORKS**https://developer.mozilla.org/en-US/docs/Learn_web_development/Howto/Web_mechanics/How_does_the_Internet_work**MDN / HOW THE WEB WORKS**https://developer.mozilla.org/en-US/docs/Learn_web_development/Getting_started/Web_standards/How_the_web_works**CLOUDFLARE / DNS BASICS**<https://www.cloudflare.com/learning/dns/what-is-dns/>**MDN / HTTP-3 & QUIC**<https://developer.mozilla.org/en-US/docs/Glossary/QUIC>

Questions are valuable: share what surprised you and what you want to build.