

Lesson 2.3

Ports & Protocols

CompTIA A+ Core 1 (220-1201) · Domain 2: Networking · Objectives 2.1 + 2.4

Today's focus skill

Students will be able to identify the well-known ports for HTTP, HTTPS, SSH, DNS, DHCP, SMTP, SMB, and RDP, distinguish between TCP and UDP, and use port knowledge to triage a real help-desk ticket. (To triage means to sort and prioritize what is happening so you can decide what to fix first.)

1. Quick facts

Duration	50 minutes · 1 class block
Pacing slot	Semester 1 · Week 6 · Day 2 (of A+ Core 1 pacing)
Group structure	Individual study + paired troubleshooting. HS or community college.
Prerequisites	L2.1 OSI / TCP/IP layers, L2.2 networking hardware (hub vs switch vs router)

2. Learning outcomes

By the end of this 50-minute block, students will be able to:

- Identify well-known ports for HTTP (80), HTTPS (443), SSH (22), DNS (53), DHCP (67/68), SMTP (25), SMB (445), and RDP (3389).
- Distinguish between TCP (connection-oriented) and UDP (connectionless), and explain when to use each.
- Explain the 3-way TCP handshake (SYN → SYN-ACK → ACK).
- Use port knowledge to triage at least one help-desk scenario (web unreachable, email send failure).
- Use the netstat or ss command to view active listening ports.

3. Career connection

Why this matters in IT careers:

Ports show up in every help-desk ticket on day one. A Tier 1 tech (a first-line support person) sorting through "my internet is broken" half the time discovers a blocked port (443 behind a corporate proxy, 53 if DNS is broken). Network admins write firewall rules and access-control lists (ACLs) in port numbers daily. Cyber analysts look for security problems by noticing odd ports on computers that should only be using standard ones. Students who memorize the well-

known ports could gain the single highest-leverage piece of A+ knowledge for actual employability.

4. NICE Framework alignment

- **Primary work role:** Technical Support Specialist (OM-STS). Knowing port-to-service mapping is core to STS troubleshooting tasks.
- **Secondary work role:** Network Operations Specialist (OM-NET). Network ops staff configure and monitor ports as their daily work.

5. Standards alignment

- **CompTIA A+ V15:** 220-1201 Objectives 2.1 (Protocols and ports) and 2.4 (Wireless and networking concepts that depend on port knowledge).
- **Federal CTE IT Career Cluster:** Network Systems pathway.
- **NICE Framework:** OM-STS, OM-NET.
- **State CTE:** Illinois CTE IT, Texas TEKS §126, available as separate per-state crosswalks on request.

6. Materials

- Slide deck: l-ports-protocols/slide-deck.pptx (25 slides)
- Assignment 1: assignment-1-port-matching.docx (printable)
- Assignment 2: assignment-2-firewall-rules.docx (performance task)
- Lab PCs or VMs with command line access (netstat / ss / nslookup)
- Whiteboard or projector for live troubleshoot demo
- Exit ticket: bottom of student handout (last page of this doc)

7. Daily pacing (50 minutes)

0:00 - 0:05 · Bell Ringer (5 min)

Bell ringer slide live on screen as students enter. Three quick questions from yesterday (hub vs switch, MAC addresses, OSI layers).

- **Check for understanding (CFU):** Cold-call 2-3 students for a verbal answer before moving on.
- **Admin:** Attendance + tech check while bell ringer runs.

0:05 - 0:15 · Mini-lesson 1: The big picture (I do · 10 min)

Slides 5-7. IP-as-building / port-as-doors analogy. The 65,536 doors split into three pools.

- **CFU:** After slide 7, ask: "What pool does port 443 fall into? What about 50000?"
- **Key terms to write on board:** well-known, registered, ephemeral, IANA

0:15 - 0:25 · Mini-lesson 2: TCP vs UDP (I do + We do · 10 min)

Slides 8-11. Walk through 3-way handshake on board. Then UDP comparison.

- **Guided practice:** Pairs sort 8 services into TCP or UDP using the comparison table on slide 11. (HTTPS, DNS, RDP, SMTP, DHCP, VoIP call, file download, online game)
- **CFU:** Each pair reports one TCP and one UDP service with reasoning.

0:25 - 0:40 · Independent practice: Well-known ports (You do · 15 min)

Slides 12-18. Students work through Assignment 1 (port matching exercise) while teacher walks through the big port table on slide 13.

- **Differentiation:** Students with extended-time accommodation get 22 minutes (1.5x multiplier) and a printed port reference sheet.
- **Acceleration:** Early finishers move to Assignment 2 (firewall rules performance task).
- **Teacher walks:** Slides 14-17 in lecture format while majority works on Assignment 1. Stop for slide 18 (common mistakes) for whole class.

0:40 - 0:48 · Real tickets (You do + We do · 8 min)

Slides 19-22. Project Scenario 1 ("my internet is broken") on screen. Students suggest next troubleshooting step at each branch. Teacher reveals correct answer.

- **Tool demo:** If lab time allows, run the commands `netstat -an` (Windows or older Linux) or `ss -tuln` (modern Linux) on the demo PC. These commands list every open and listening port on the machine - a real-world view of what they just studied.

0:48 - 0:50 · Exit ticket (You do · 2 min)

Slide 25. Three quick questions: (1) name a well-known port, (2) TCP vs UDP main difference, (3) what felt tricky today.

- **Collection:** Drop in LMS or paper. Use as starter for tomorrow's warm-up.

8. Deliverables checklist

By end of class, each student should have:

- Completed Assignment 1 (port matching) - submitted per teacher's instructions
- Demonstrated guided-practice sort (TCP vs UDP)
- Submitted exit ticket (3 questions)

Optional for early finishers or homework:

- Started Assignment 2 (firewall rules performance task)

9. Rubric (Assignment 1 + Exit Ticket)

Criterion	Exempl.	Profic.	Develop.	Begin.	Points
Technical accuracy <i>Port-to-service matches; TCP vs UDP correct</i>	All correct	1-2 minor errors	3-5 errors	6+ errors	HS 35 / CC 45
Documentation quality <i>Reasoning shown; explanations clear</i>	Crystal clear	Mostly clear	Sparse	Missing	HS 25 / CC 30
Professionalism <i>Verbal sort + exit ticket effort</i>	Engaged + clear	Engaged	Partial	Disengaged	HS 20 / CC 15
Time management	On time	Slight delay	Rushed	Incomplete	HS 10 / CC 5
Safety / acceptable use	Followed	Mostly	1 lapse	Multiple	HS 10 / CC 5

HS column weights professionalism + safety higher per CTE convention. CC column weights tech accuracy + documentation higher per employer-ready expectations. Total = 100 points either way.

10. Teacher notes

Common student mistakes

- Students confuse DNS (UDP/53) with DHCP (UDP/67-68). Teach by use case: "I'm asking for a name lookup" vs "I'm asking for an IP address."
- Students assume port 80 + 443 are different protocols. They're the same (HTTP), just one encrypted with TLS.
- Students forget that ephemeral ports exist. Show netstat output of an active browser to make this concrete.
- Students try to memorize port numbers without context. Group them by category (web, email, admin, file sharing) instead.

Accommodations

- Extended time (1.5x): auto-enabled on quiz timer if accommodations.extended_time = true on student profile.
- Simplified language alt: not available for v1 (Phase 2 of kit production).
- Audio narration: not available for v1 (Phase 3; teacher aide or TA can read aloud if needed).
- Printed port reference: provide to any student who requests, no documentation required.

Acceleration / extension

- Assignment 2 (firewall rules performance task) for early finishers.
- Optional: have student demo netstat -an or ss -tuln on the lab PC to the class.

11. Sub plan (if teacher absent)

See the separate sub-plan.docx for the full one-page sub instructions. Short version: students watch slide deck self-paced via LMS, complete Assignment 1 only, no lab equipment access, no command-line tools.

12. Student handout (print + distribute)

This page is the student handout. Print and hand out at start of class. Includes today's outcomes, what to do, exit ticket, and where to find help.

Lesson 2.3 · Ports & Protocols

What you'll be able to do by end of class:

- Name the well-known ports for HTTP, HTTPS, SSH, DNS, DHCP, SMTP, SMB, RDP.
- Tell when to use TCP vs UDP.
- Walk through the 3-way handshake.
- Use port knowledge to triage a stuck help-desk ticket.

What you'll do today:

- Bell ringer (5 min): yesterday review
- Mini-lessons (20 min): big picture + TCP vs UDP
- Assignment 1 (15 min): port matching
- Real ticket walkthrough (8 min): triage practice
- Exit ticket (2 min): three questions

How to submit:

[Teacher fills this in: paper / Google Classroom / Canvas / etc.]

Stuck? Try this order:

1. Look at the port memorization table on slide 13 in the deck.
2. Ask your partner. Then a different partner.
3. Ask the teacher.
4. Open RTJ on your laptop: revystechjourney.com → Study Mode → Lesson 2.3.

Exit ticket (last 2 minutes):

1. Name one well-known port and what service it runs.
2. What is the main difference between TCP and UDP?
3. What felt tricky today? (One sentence.)