

Builder Week 2: Networks, Wi-Fi and the Cloud

Mon, Oct 26 – Tue, Oct 27 · 2:30–4:00 PM · Room 105 (or live on Zoom; the link comes by email)

This week: Build a working network, understand how devices get addresses and find websites, set up Wi-Fi the safe way, and sort cloud services. Tuesday is the Builder Gate.

Heads up

- Parent notices for crew fundraisers go out this week.
- Study for the gate all week: 25 tracked minutes on the Builder Study Path is the best warm-up.

Read-aheads

Before Monday (15 minutes)

- Read the How a network works notes below.
- Draw your home or school network on paper: internet -> modem -> router -> devices.
- Do 15 Builder study cards, focused on DHCP, DNS, router and switch.

Before Tuesday (20 minutes)

- Read the Wi-Fi and Cloud notes below.
- Make a 3-column chart: SaaS, PaaS, IaaS. Put two examples you use in the SaaS column.
- Finish the Builder Study Path and try the Check yourself questions.

The missions

Monday, Oct 26 · Day 5

4A · Lab Build-a-Network Night

Your crew builds a small school network in Cisco Packet Tracer: a modem, a router, a switch, and four laptops. Turn on DHCP so devices get addresses automatically, then prove it works by pinging across the room. You will see exactly how DNS, DHCP, and routers fit together.

1. Place and cable the modem, router, switch, and four PCs with the correct cable types.
2. Enable DHCP on the router and confirm each PC receives an IP address.
3. Ping between PCs and record the result; then explain what DNS would add to this network.

Turn in: Packet Tracer file plus a screenshot of successful pings and the DHCP address table.

Tuesday, Oct 27 · Day 6

Builder Gate today. You must pass the Decoder Gate first.

4B · Gate day Wi-Fi Wardrobe

Dress a new home router for success: pick the SSID, choose WPA3 over the old options, and know which Wi-Fi generation you are buying. Then explore how the cloud fits in with SaaS, PaaS, and IaaS. Finish with the Builder Gate to earn badge two.

1. Configure the sample router: SSID, WPA3 passphrase, and a guest network, and explain each choice.
2. Sort six real-world services into SaaS, PaaS, and IaaS and describe virtualization in one sentence.
3. Take the 20-question Builder Gate solo; 17 of 20 (85 percent) passes.

Turn in: Router configuration sheet, cloud sorting chart, and each member's Builder Gate result.

Notes

How a network works

- Modem: connects your building to the internet provider's line (cable, fiber or DSL).
- Router: connects different networks, like your home network to the internet, and sends traffic between them.
- Switch: connects wired devices inside one network.
- Access point: gives Wi-Fi coverage. Most home routers include a switch and an access point in one box.
- LAN: a local area network (one home, one school building). WAN: a wide area network over long distances. The internet is the biggest WAN.

Addresses and names

- IP address: every device on a network has one, like a mailing address.
- DHCP hands out IP addresses automatically when a device joins.
- DNS turns a name like firstbadge.org into an IP address, like a phone book.
- Ping sends a small test message to another device to see if it answers.

Wi-Fi

- SSID: the network name you see in the list.
- Security: WPA3 is the strongest. WPA2 is still common. WEP is broken and should never be used. An open network has no encryption.
- Generations: Wi-Fi 4 = 802.11n, Wi-Fi 5 = 802.11ac, Wi-Fi 6 = 802.11ax.
- A guest network keeps visitors off the devices on your main network.

The cloud

- SaaS (Software as a Service): ready-to-use apps in a browser, like online email or document editors.
- PaaS (Platform as a Service): a platform where developers build and run their own apps.
- IaaS (Infrastructure as a Service): rented virtual servers, storage and networks.
- Virtualization: one physical computer runs several virtual machines, each acting like its own computer.

Vocabulary

Router	Connects separate networks
Switch	Connects devices inside one network
DHCP	Gives devices IP addresses automatically
DNS	Translates names into IP addresses
SSID	A Wi-Fi network's name
Virtual machine	A computer that runs as software on another computer

Check yourself

1. A laptop joins Wi-Fi but has no IP address. Which service did not do its job?
2. Which Wi-Fi security setting should a new router use?
3. Your school pays for an online video meeting app. SaaS, PaaS or IaaS?

Answers: 1. DHCP 2. WPA3 (WPA2 if a device can't use WPA3). Never WEP or open. 3. SaaS

Bring

- A charged device
- Your student ID card
- Your network drawing from the read-ahead