

## Chapter 1.1: Laptop Hardware

Laptop Batteries:

- Lithium-Ion (Li-ion) and Lithium-Ion polymer (LiPo) are common
  - No “memory effect” (capacity limiting) but do diminish the capacity for each charge.

Laptop Keyboard:

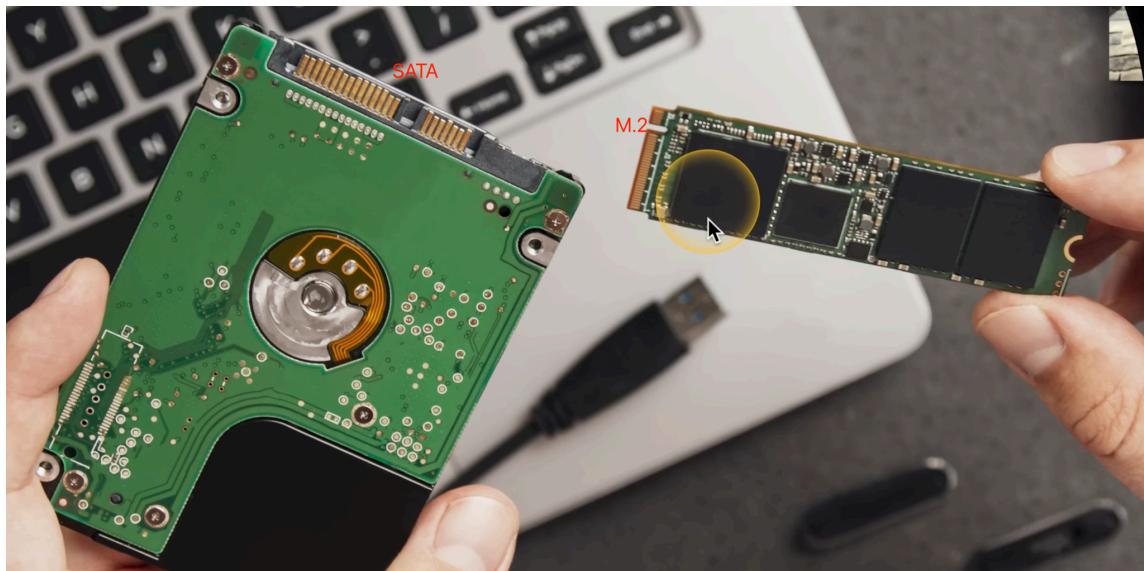
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Laptop Memory:

- Small Outline Dual In-line Memory Module (SO-DIMM) – very common

Laptop Storage:

- Magnetic disk (older devices): Traditional spinning drive platters
  - 2.5" form factors (3.5 inch for desktops)
- SSD (Solid-state drive)
  - All memory, no moving parts
  - Silent, fast access time, less latency
  - 2.5 inch form factors for SATA connected SSD
- M.2 (SSD M.2)
  - Smaller form factor
  - No SATA data or power cables

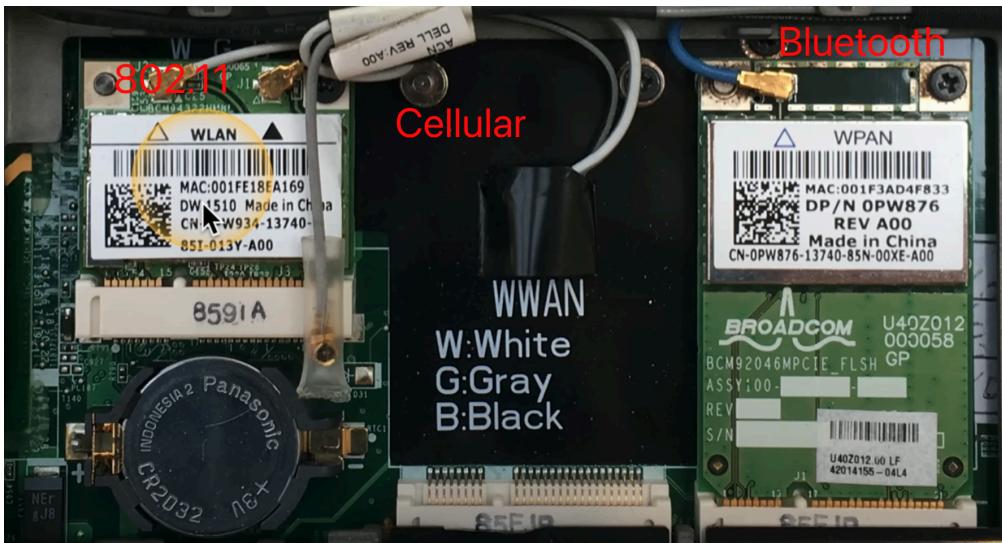


802.11 wireless and Bluetooth



Mini PCI

Mini PCIe



Usually Antenna Wires Connected

#### Near-field Communication (NFC)

- Used in short-distance authentication like Apple Pay.

## **Chapter 1.2: Laptop Displays**

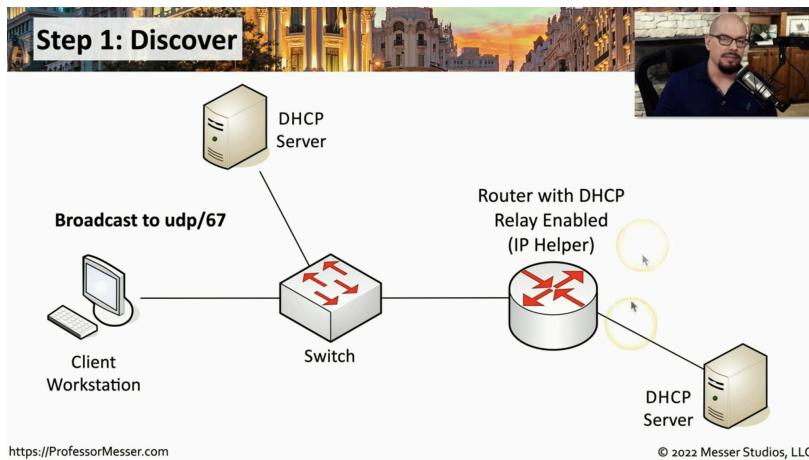
Portable LCD (Liquid Crystal Display) - ongoing

- Light shines through liquid crystals
  - Advantages: Lightweight, low power, inexpensive
  - Disadvantages: Blacks levels are challenging, and require different types of backlights.

## **Chapter 2.4: Network Services**

- Do more research on SCADA / ICS systems (little previous knowledge).

## Chapter 2.5: Assigning IP addresses



### DHCP:

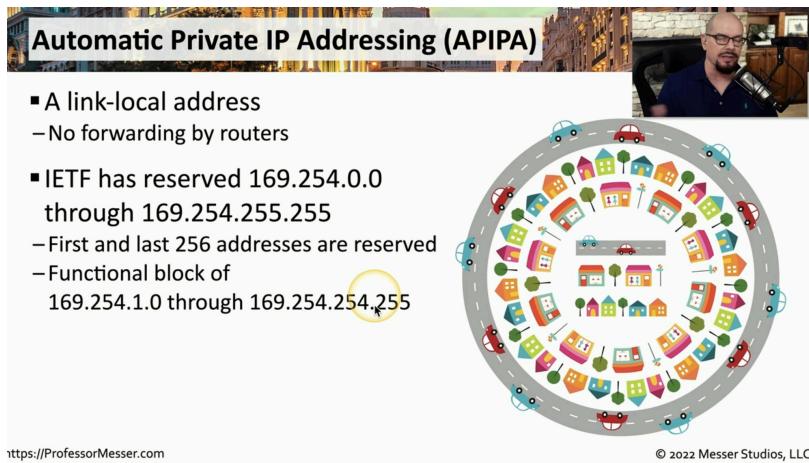
- **DORA**

- Step1: Discover:
  - Client broadcast to udp/67
  - Broadcast will be sent to all devices on the local network. If the router enables DHCP relay/ IP Helper (a proxy service), then the broadcast will be forwarded to the DHCP server outside the local subnet.
- Step2: Offer:
  - DHCP servers will send their offers back to the client machine using broadcast to udp/68; the reason we are still using broadcast is that the client still does NOT have an IP address.
  - Should multiple offers arrive, the client will examine each offer and decide which one it should take.
- Step3: Request:
  - The client sends a formal request to the DHCP server whom the client wishes to take the offer from via a broadcast to udp/67. Note: *This is STILL a broadcast message that everyone on the LAN can see.*
- Step4: Acknowledge:
  - The DHCP server receives the formal request and sends an acknowledgement to the client via a broadcast to udp/68, confirming that the client can indeed assign itself with the configuration included in the offer.
- Since DHCP assigns an IP address from a first-available pool, when a new device starts up and joins the LAN, it will likely get a different IP address each time. However, sometimes we want static IP addresses for important devices such as printers and servers. How can we mitigate this issue?

- We can disable DHCP service and manually configure the network.  
Apparently, this approach is not practical.
- Instead, we can configure an IP reservation on the DHCP server. Namely, we will associate MAC addresses with the IP addresses for reservation.

When there is no DHCP server to reach:

### Automatic Private IP addressing (APIPA)/ Link-local address



**Automatic Private IP Addressing (APIPA)**

- A link-local address
  - No forwarding by routers
- IETF has reserved 169.254.0.0 through 169.254.255.255
  - First and last 256 addresses are reserved
  - Functional block of 169.254.1.0 through 169.254.254.255

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The host machine itself automatically assigns a random address to itself: It picks one address and initiates an ARP request in the LAN. If no one responds, it keeps that APIPA; else, pick another address and redo the process until success.