Here is a **comprehensive sentence-by-sentence study note breakdown** of the document **“39. Wired Connections”**, structured into bullet points for clarity and optimized for **CompTIA A+ 1102 Objective 1.7**, which deals with **configuring Windows networking features**.

**✅ Structured Study Notes – Wired Connections in Windows Networking**

**🧠 Overview of Wired Networking in Windows**

* Windows supports both **wired and wireless connections**.
* This lesson focuses exclusively on **wired network connections**.

**🔌 Types of Wired Media**

* **Two main types** of wired connections:
  + **Copper (electrical)** – UTP/STP with RJ45 connectors.
  + **Fiber (optical)** – Requires fiber NICs and connectors.

**📦 Copper Cabling Types:**

* **Cat5, Cat6, Cat7, Cat8**
* Uses:
  + **UTP (Unshielded Twisted Pair)**
  + **STP (Shielded Twisted Pair)**
* Common termination: **RJ45 connector**

✅ Example: The author’s organization uses **Cat6/Cat7 UTP** terminated with **RJ45**, connected to Intel NICs.

**🖥️ Viewing Network Adapter Details in Windows**

**Steps:**

1. Open **Device Manager** from the Start Menu.
2. Expand **Network Adapters**.
3. Identify and **double-click your wired adapter** (e.g., Intel 82574L Gigabit Ethernet).
4. Review tabs in the **Properties window**.

**🔍 Properties Window Tab Breakdown**

**1. General Tab**

* Shows:
  + Device name/type (e.g., Network Adapter)
  + Manufacturer (e.g., Intel)
  + Location (e.g., PCIe Slot 3)
  + Status (e.g., “Working properly”)

**2. Advanced Tab**

* Advanced NIC settings (for advanced admins).
* Example: Enabling **jumbo frames** for SANs (e.g., 4088- or 9014-bytes vs 1500 standard).
  + A **jumbo frame** is an **Ethernet frame** that is **larger than the standard size** of 1500 bytes (the default **Maximum Transmission Unit** or **MTU**).
    - **Standard Ethernet frame** MTU: 1500 bytes
    - **Jumbo frame** MTU: Typically, **9000 bytes** (can range from ~4088 to 9014 bytes depending on the device)
  + When you **enable jumbo frames** for a **Storage Area Network (SAN)**, you are telling the **network devices (NICs, switches, SAN interfaces)** to send and receive **larger-than-normal packets** — typically up to **9000 bytes** instead of the default **1500 bytes**
* Leave default unless you understand the specific feature.

**3. Driver Tab**

* Details about the **network driver**: A **network driver** is a piece of **software that acts as a translator** between the **operating system** and the **network interface card (NIC)** or **network adapter**. Without the driver, the OS has **no way to control or communicate** with the network hardware.
  + Version
  + Date
  + Manufacturer
* Functions:
  + **Update driver**
  + **Rollback driver**
  + **Disable/Uninstall** device

**4. Details Tab**

Shows key-value data like:

* **Device Description** is the user-friendly name Windows assigns to a piece of hardware.
* You can find it in:
  + Device Manager → Right-click device → Properties → Details tab → Select “Device Description”
  + **🏷️ Example: “Intel(R) Ethernet Connection I219-V”**
* **💡 Purpose:**
  + Helps users and techs identify what the device is (e.g., network adapter, GPU, sound card).
  + Used in system tools, logs, and interfaces to show clear names instead of cryptic hardware codes.
* A **Hardware ID** is a **unique identifier** assigned to a device by the manufacturer.
* It consists of **Vendor ID** (VEN) and **Device ID** (DEV).
* Found in:
  + **Device Manager** → Device **Properties** → **Details tab** → Choose **“Hardware Ids”**

**🔍 Why Is Hardware ID Important?**

| **Use Case** | **Purpose** |
| --- | --- |
| ✅ **Driver installation** | Windows uses the Hardware ID to **match the correct driver** |
| ✅ **Troubleshooting unknown devices** | Helps you find out **what an unrecognized device really is** |
| ✅ **Manual driver search** | You can use it to look up the right driver on vendor websites |

📘 If a device shows up as **“Unknown device”**, the **Hardware ID** is your best tool to identify it and find the right driver.

**5. Events Tab:** The Events tab is found in Device Manager under the Properties of a hardware device. It shows a timeline of important events related to that device.

* Tracks history of the device.
* Example: Installation date (e.g., October 2021)
* *Device Manager → Right-click a device → Properties → Events tab*

**📅 What Does the Events Tab Show?**

It lists **chronological logs** of:

* When the device was **installed**
* When the driver was **updated**
* When the device was **started or stopped**
* If there were **driver issues**, crashes, or reinstallations

Each event entry includes:

* **Date and time**
* **Type of event** (e.g., “Device installed”, “Driver updated”, “Device configured”)
* Sometimes links to **more detailed logs** in Event Viewer

**6. Resources Tab**

* Displays:
  + **Memory range** used by NIC
  + Useful for **hardware troubleshooting**

The **Resources tab** shows which **hardware resources** are being used by a particular device, such as:

* **Memory Range**
* **I/O Range (Input/Output ports)**
* **IRQ (Interrupt Request)**
* **DMA (Direct Memory Access)**

**7. Power Management Tab**

* Key Options:
  1. **Allow the computer to turn off this device to save power**

→ Useful on laptops for energy conservation.

* 1. **Allow this device to wake the computer, powers it on remotely (Wake-on-LAN)**

→ Enables network-triggered boot-ups for patching or remote use.

🛠 Wake-on-LAN is important for **enterprise patch management** while devices are off.

**🌐 Accessing Wired Connection Settings**

**Steps:**

1. Click **network icon** in taskbar.
2. Open **Network & Internet Settings**.
3. View Ethernet status (e.g., “Ethernet 0 connected to a private network”).

**⚙️ Inspecting and Modifying Wired Properties**

* Click **Properties** under Ethernet.
* Key sections:
  + **Network Profile** (Public or Private)
  + **Metered Connection** (relevant for wireless)
  + **IP Settings** (automatic via DHCP or manual)

**🧾 Example IP Configuration (via DHCP)**

| **Setting** | **Value** |
| --- | --- |
| **IPv4 Address** | 192.168.150.135 |
| **DNS Server** | 192.168.150.2 |
| **DNS Suffix** | local domain |

* Indicates that IP info was assigned **automatically by a DHCP server**.

**🧱 Adapter & Network Specs Overview**

* Manufacturer: **Intel**
* Driver info visible (version, vendor, etc.)
* MAC Address (12-digit **hexadecimal hardware address**)
* Connection Speed:
  + Negotiated at **1000 Mbps (1 Gbps)**
  + Matches **Gigabit Ethernet NIC + Gigabit switch/router**

**📝 Key Takeaways for Exam and Practice**

| **Concept** | **Summary** |
| --- | --- |
| **Wired types** | Copper (Cat5–8), Fiber |
| **Connectors** | RJ45 (copper), Fiber-specific |
| **NIC settings** | View via Device Manager → Adapter Properties |
| **Power settings** | Includes Wake-on-LAN for remote boot |
| **IP/DNS config** | Can be manual or via DHCP |
| **Speed negotiation** | Should match hardware capability (e.g., 1 Gbps) |

**🎯 CompTIA A+ 1102 Relevance**

| **Objective** | **Relevance** |
| --- | --- |
| **1.7** | Configure Microsoft Windows networking features |
| **4.3** | Troubleshooting device connectivity and performance |