



## Lecture 8 — CMD Networking Commands, Disk Management, GUID Partition, Serial Number

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### 1. Forgetting a Wi-Fi Network from CMD

#### What it is

Sometimes your PC automatically connects to old or insecure Wi-Fi networks. Forgetting a saved network removes its SSID and password from Windows so it no longer connects automatically.

#### Commands & Steps

##### 1. View all saved Wi-Fi profiles:

2. netsh wlan show profiles

→ Lists all networks your system remembers.

##### 3. Delete a specific Wi-Fi profile:

4. netsh wlan delete profile name="CoffeeShop\_WiFi"

→ This removes the saved credentials for that SSID.

#### Why it's used

- Clears old or compromised Wi-Fi credentials.
  - Fixes connection issues caused by corrupted profiles.
  - Improves security by removing public/hotspot credentials.
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## 2. DNS & Network Reset Commands

These commands repair or refresh different parts of the Windows network stack.

### Commands Explained

Command	Function	Use Case
ipconfig /flushdns	Clears local DNS cache	Fixes DNS-related errors, removes cached old IPs
ipconfig /registerdns	Re-registers computer's DNS with server	Refreshes DNS entries in domain environment
netsh winsock reset	Resets Winsock catalog	Fixes socket corruption, resolves network adapter issues

### Why these commands matter

Over time, network configurations or cached entries can cause slow or failed connectivity. Running these resets restores the system to a clean state without reinstalling network drivers.

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## 3. Useful Command Prompt Commands

A full list is available here:

 [Command Prompt Command List — Lifewire](#)

### Common Important Commands for Networking & System

Command	Description
ping <ip or domain>	Tests connectivity
tracert <domain>	Shows route packets take
netstat -ano	Displays active connections and ports
systeminfo	Shows system configuration
sfc /scannow	Checks and repairs corrupted system files
chkdsk /f	Checks and fixes disk errors

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## 4. GUID Partition Table (GPT)

### What it is

**GUID Partition Table (GPT)** is the latest partitioning standard replacing the older **MBR (Master Boot Record)**. It's part of the **UEFI firmware** system.

- **GUID** = *Globally Unique Identifier* (each partition has a unique ID).
- GPT is more reliable and supports large drives and more partitions.

### Why it's used

- Supports drives larger than **2TB**.
  - Allows up to **128 partitions** on Windows.
  - Stores **redundant partition tables** (at beginning & end of disk) for recovery.
  - Works with **UEFI mode** and **Secure Boot**.
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## 5. Disk Management Overview

### How to open

Press Win + R → type:

diskmgmt.msc

### Common Partitions Explained

Partition Type	Description	Approx. Size
<b>EFI System Partition (ESP)</b>	Stores bootloader files used by UEFI	~260 MB
<b>MSR (Microsoft Reserved)</b>	Reserved for Windows internal use	~16 MB
<b>Primary Partition (NTFS)</b>	Main storage for OS or data	Variable
<b>Recovery Partition</b>	Contains system recovery tools	~500 MB–1 GB

### Legacy (MBR) vs GPT (UEFI)

<b>Feature</b>	<b>MBR</b>	<b>GPT</b>
Compatibility	Older BIOS	UEFI systems
Max Drive Size	2 TB	> 2 TB supported
Max Partitions	4 primary	128 partitions
Boot Files	Stored in MBR sector	Stored in EFI partition
Reliability	Single table (can corrupt)	Redundant tables
Data Recovery	Difficult	Easier (backup table)
Boot Indicator	Straight loading bar	Circular loading animation

### **How to check partition style**

1. Open **Disk Management** → Right-click disk → **Properties** → **Volumes tab** → “Partition style” shows **MBR** or **GPT**.
2. Or use CMD:
3. `diskpart`
4. `list disk`
  - o If a disk shows an asterisk (\*) under **GPT**, it's a GPT-partitioned disk.

## **6. MBR (Master Boot Record)**

### **What it is**

Old partitioning system used by BIOS. Contains bootloader and partition table in first sector of disk.

### **Limitations**

- Supports only **up to 2 TB** disks.
- Maximum **4 primary partitions**.
- If MBR gets corrupted, the entire disk can become unbootable.
- Very **low chance of data recovery** if MBR is damaged.

## **When to use**

Use only on legacy systems without UEFI support.

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## **7. Checking Partition Style from CMD**

### **Command steps**

1. Open **Command Prompt (Admin)**
2. Run:
3. `diskpart`
4. `list disk`

Example Output:

Disk #	Status	Size	Free	Dyn	Gpt
Disk 0	Online	476 GB	0 B		*

→ The \* symbol under GPT means it's a GUID partitioned disk.

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## **8. Finding Computer Serial Number via CMD**

### **Why it's needed**

- For asset tracking, warranty verification, or hardware support.
- Each system's BIOS contains a unique serial number.

### **Command**

```
wmic bios get serialnumber
```

### **Output Example**

SerialNumber

ABC123XYZ

## Alternate commands

- Using PowerShell:
  - `Get-WmiObject win32_bios | Select-Object SerialNumber`
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## 9. Driver Update

### What it is

Drivers are software components that allow the OS to communicate with hardware (GPU, network card, sound card, etc.).

### Why update drivers

- Fixes bugs and crashes.
- Improves performance and compatibility with new OS updates.
- Patches security vulnerabilities.

### How to update drivers manually

1. Press Win + R → type `devmgmt.msc` → open **Device Manager**.
2. Expand the hardware category (e.g., “Display adapters”).
3. Right-click device → **Update driver**.
4. Choose **Search automatically for drivers** or **Browse my computer** if you downloaded manually.

### Security note

- Always download drivers from **official vendor websites** (e.g., Intel, NVIDIA, AMD, Dell, HP).
  - Avoid cracked or third-party driver tools (may inject malware).
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## 10. CBA — Certificate-Based Authentication

### What it is

**Certificate-Based Authentication (CBA)** uses **digital certificates** instead of passwords to verify user or device identity.

## How it works

- A trusted Certificate Authority (CA) issues certificates to users/devices.
- When connecting to a network, server, or VPN, the client presents its certificate.
- Server validates the certificate's authenticity and trust chain.
- If valid → user/device is authenticated.

## Why it's used

- Eliminates password reuse & phishing risks.
- Ensures strong, cryptographically verified identity.
- Common in **corporate networks, VPNs, and Wi-Fi (EAP-TLS)** authentication.

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Topic	Description	Command / Tool
Forget Wi-Fi	Remove saved network profile	netsh wlan delete profile name="SSID"
DNS Flush	Clears DNS cache	ipconfig /flushdns
Winsock Reset	Fixes network socket errors	netsh winsock reset
Disk Management	Manage partitions	diskmgmt.msc
Check Partition Style	See MBR or GPT	diskpart → list disk
BIOS Serial Number	View system serial	wmic bios get serialnumber
Driver Update	Update system drivers	devmgmt.msc
CBA	Authentication with digital certificate	Used in VPNs, corporate networks

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 **Quick Visual Summary (Concept Flow)**

CMD → netsh/ipconfig/netstat → Network Reset / Diagnostics



Disk Management → Check GPT vs MBR → EFI / MSR / Recovery



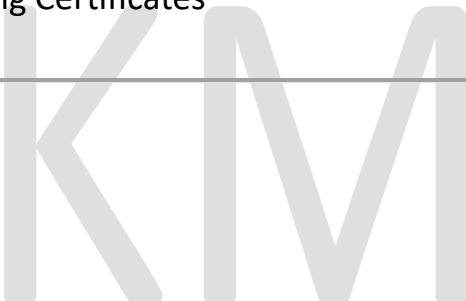
BIOS (serial number) → System Identification



Device Manager → Driver Update → Improved Performance



CBA → Secure Login using Certificates





## LECTURE 8 — FULL SUMMARY

### 1. Forgetting Wi-Fi from CMD

You can remove saved Wi-Fi networks using CMD.

The command `netsh wlan show profiles` lists all saved Wi-Fi profiles.

`netsh wlan delete profile name="SSID"` deletes a specific Wi-Fi network.

#### Why needed:

To remove old, corrupted, or unsafe public Wi-Fi credentials and fix connection problems.

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### 2. DNS & Network Reset Commands

Various ipconfig and netsh commands help fix network issues:

Command	Purpose
<code>ipconfig /flushdns</code>	Clears DNS cache (fixes old/bad DNS entries)
<code>ipconfig /registerdns</code>	Refreshes DNS registration
<code>netsh winsock reset</code>	Fixes Winsock corruption (socket issues)

#### Why used:

To fix slow internet, DNS errors, IP issues, and connectivity drops.

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### 3. Helpful CMD Commands

Important system/network commands:

- `ping` – tests connectivity
  - `tracert` – shows packet path
  - `netstat -ano` – shows open ports & connections
  - `systeminfo` – system details
  - `sfc /scannow` – fixes corrupted system files
  - `chkdsk /f` – fixes disk errors
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## 4. GPT (GUID Partition Table)

Modern partitioning standard used with UEFI.

### Advantages:

- Supports >2TB disks
- Up to 128 partitions
- Stores backup partition table (more reliable)
- Essential for Secure Boot

GPT uses a unique GUID for every partition.

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## 5. Disk Management

Tool: `diskmgmt.msc`

Common partitions:

- **EFI** – stores UEFI boot files
  - **MSR** – reserved for Windows
  - **Primary** – OS/data storage
  - **Recovery** – recovery tools
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## 6. MBR (Master Boot Record)

Old partitioning system (BIOS).

### Limitations:

- Max 2 TB disk
  - Only 4 primary partitions
  - Single boot sector → easy to corrupt
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## **7. Check Partition Style Using CMD**

Use DiskPart:

diskpart

list disk

If GPT has \*, then the disk is GPT.

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## **8. Check BIOS Serial Number**

Command:

wmic bios get serialnumber

Used for warranty, asset tracking, hardware support.

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## **9. Driver Update**

Drivers allow communication between OS & hardware.

### **Why update drivers?**

- Fix bugs
- Improve performance
- Patch security issues

Tool: **Device Manager (devmgmt.msc)**

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## **10. CBA (Certificate-Based Authentication)**

Authentication using digital certificates instead of passwords.

### **Where used:**

- Corporate networks
- VPN authentication
- Secure Wi-Fi networks (EAP-TLS)

## Why used:

- Higher security
  - No passwords to steal
  - Identity cryptographically verified
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## CONCLUSION

This lecture covers essential CMD networking commands, disk partition formats, system identification, driver management, and certificate-based authentication. These skills help you:

- Troubleshoot and reset network issues
- Understand modern (GPT/UEFI) vs old (MBR/BIOS) disk systems
- Manage storage and recovery partitions
- Retrieve hardware information (serial number)
- Update drivers safely
- Authenticate securely using certificates (CBA)

Mastering these concepts makes you job-ready as an IT technician, network engineer, system admin, or ethical hacker.

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## DETAILED MINDMAP (Text Version)

### LECTURE 8

```
|  
|--- 1. Wi-Fi Profile Management  
|   |--- netsh wlan show profiles  
|   |--- netsh wlan delete profile  
|  
|--- 2. DNS & Network Resets  
|   |--- ipconfig /flushdns
```

|    └ ipconfig /registerdns

```
|   └ netsh winsock reset
```

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## └— 3. CMD Tools

|    |- ping

|   └-- tracert

|    |    |- sfc /scannow

| └─ chkdsk /f

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## 4. Disk Partitioning

| | - GPT

| | |- UEFI based

->2TB

| | |- 128 partitions

## | | └ Backup tables

| ↘ MBR

|      | – BIOS based

| ← 2TB limit

|     └ Max 4 partitions

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## — 5. Disk Management

|   |   └– diskmgmt.msc

|     └– EFI partition

| ← MSR

```
|   |- Recovery partition  
|   \- Primary partition  
|  
|  
|- 6. System Identification  
|   \- wmic bios get serialnumber  
|  
|  
|- 7. Driver Updates  
|   |- devmgmt.msc  
|   |- Performance improvement  
|   \- Security patches  
|  
|- 8. Certificate-Based Authentication  
  |- CA issues certificate  
  |- Used in VPN / WiFi  
  \- Passwordless authentication
```

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## TOP INTERVIEW QUESTIONS WITH DETAILED ANSWERS

(For System Admin, Networking, Support Engineer, Ethical Hacking Roles)

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### **1. What is the use of the command netsh wlan show profiles?**

#### **Answer:**

This command displays all Wi-Fi networks that the system has previously connected to. It shows saved SSIDs and their configuration details. Useful for auditing old Wi-Fi profiles or removing unnecessary networks.

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## **2. How do you delete a saved Wi-Fi profile from CMD and why would you do it?**

**Answer:**

Command:

```
netsh wlan delete profile name="SSID"
```

**Reason:**

To remove corrupted, insecure, or unused Wi-Fi networks so the system does not auto-connect to them.

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## **3. What does ipconfig /flushdns do?**

**Answer:**

It clears the DNS resolver cache.

This removes old or incorrect DNS records and fixes website loading issues caused by DNS misconfiguration.

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## **4. What is Winsock and what does netsh winsock reset fix?**

**Answer:**

Winsock is Windows' network API that manages socket connections.

netsh winsock reset fixes:

- Corrupted TCP/IP stack
  - Applications not connecting to the internet
  - Network adapter misbehavior
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## **5. Difference between ping and tracert?**

**Answer:**

- **ping** checks connectivity with an IP/Domain and measures latency.
  - **tracert** shows the exact path (hops/routers) data takes to reach a destination.
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## **6. What is GPT and why is it better than MBR?**

**Answer:**

GPT is a modern partitioning system used with UEFI.

It supports >2TB disks, allows up to 128 partitions, and stores backup partition tables for reliability.

MBR is older, supports only 2TB and 4 partitions, and is easily corrupted.

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## **7. What is the EFI System Partition (ESP)?**

**Answer:**

A small partition (around 260 MB) used by UEFI firmware to store bootloaders, drivers, and startup files.

Without EFI, Windows cannot boot in UEFI mode.

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## **8. How do you check if a disk is GPT or MBR using CMD?**

**Answer:**

Use:

diskpart

list disk



If there is a \* under the GPT column, the disk uses GPT.

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## **9. What is the command to check a computer's BIOS serial number?**

**Answer:**

wmic bios get serialnumber

Used for warranty checks, corporate asset management, or support.

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## **10. Why should drivers be updated regularly?**

**Answer:**

- Better hardware stability
- Performance improvements

- Security updates
- Compatibility with latest Windows patches

Drivers act as a bridge between hardware and OS.

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## **11. What is Certificate-Based Authentication (CBA)?**

**Answer:**

A method where users authenticate using a digital certificate instead of a password.

It is more secure because certificates cannot be phished or guessed.

Used in:

- VPNs
  - Enterprise Wi-Fi
  - Corporate login systems
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## **12. Advantages of certificate-based authentication over passwords?**

**Answer:**

- No password reuse
  - Cannot be brute-forced
  - Resistant to phishing
  - Strong cryptographic identity verification
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## **13. What does netstat -ano show?**

**Answer:**

- All active connections
- Listening ports
- Associated process IDs (PID)

Useful for finding malware connections or checking which application is using a port.

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#### **14. What is sfc /scannow used for?**

**Answer:**

System File Checker scans Windows system files and repairs corrupted or missing ones.

Used when system behaves unpredictably.

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#### **15. What does chkdsk /f do?**

**Answer:**

Checks disk integrity, finds file system errors, and fixes them.

Useful for bad sectors and disk corruption issues.

