



**Group 2:**  
**2G (GSM/CDMA) –**  
**Digital voice and SMS**  
**messaging.**

# Introduction to 2G Technologies

- **2G is the second generation of mobile networks, transitioning from analog to digital.**
- **Introduced digital voice communication and SMS messaging.**
- **Two major technologies: GSM (Global System for Mobile Communications) and CDMA (Code Division Multiple Access).**
- **Launched in the early 1990s**

# GSM Technology Overview

- Global System for Mobile Communications
- became the world's most widely used mobile network standard, supporting voice calls, SMS, and basic data services
- its concept emerged from a cell-based radio system being developed in Bell Laboratories in the 1970s.
- developed by the European Telecommunications Standards Institute (ETSI) in 1991 to replace 1G analog networks with a more efficient digital system.

# GSM Technology Overview

- **GSM is a widely adopted standard for mobile communications.**
- **Uses Time Division Multiple Access (TDMA) to assign time slots for multiple users.**
- **Enables international roaming and has a strong global presence.**

# FEATURES OF GSM

1

**Digital Communication**  
– Uses digital technology for improved voice clarity, security, and efficiency.

2

**International Roaming** – Allows users to access mobile networks in different countries using the same SIM card.

3

**SIM Card-based Authentication** – Uses a SIM (Subscriber Identity Module) card to store subscriber information, enabling easy device switching.

4

**Support for Voice and Data** – Enables both voice calls and data services like SMS, MMS, and mobile internet.

# FEATURES OF GSM

5

**Efficient Spectrum Utilization** – Uses TDMA (Time Division Multiple Access) and FDMA (Frequency Division Multiple Access) for better bandwidth management.

6

**Encryption and Security** – Implements authentication and encryption to secure communications against eavesdropping.

7

**Cellular Network Structure** – Divides coverage areas into cells to ensure seamless handover between towers for uninterrupted connectivity.

8

**Call Forwarding & Waiting** – Supports additional calling features like call forwarding, call waiting, and conference calling.

# BENEFITS OF GSM

- **Global Roaming:** International standardization enables seamless connectivity.
- **SIM Card Flexibility:** Users can switch devices and carriers easily.
- **Mature Ecosystem:** Extensive global adoption supports a wide range of devices.

# CHALLENGES OF GSM

- **Spectrum Efficiency:** TDMA is less efficient than CDMA.
- **Slower Data Speeds:** Early GSM networks prioritized voice over data.
- **Security Vulnerabilities:** Initial encryption had weaknesses that required improvements.

# CDMA Technology Overview

- CDMA allows multiple users to share the same frequency using unique codes.
- Offers better spectrum efficiency and clearer call quality.
- Less widely adopted globally, with limited roaming capabilities.

# FEATURES OF CDMA

1

**Efficient Spectrum Use**  
– Allows multiple users to share the same frequency without interference.

2

**Better Call Quality –**  
Reduces background noise and improves voice clarity.

3

**Strong Security –** Uses encryption to prevent eavesdropping.

4

**Soft Handoff –** Smooth transition between cell towers without call drops.

# FEATURES OF CDMA

5

**Higher Capacity –**  
Supports more users per tower compared to GSM.

6

**No SIM Card Requirement –** CDMA devices are directly linked to the network.

7

**Faster Data Transmission –** Supports high-speed data services like EV-DO and 3G.

8

**Power Efficiency –** Reduces battery consumption through optimized signal transmission.

# BENEFITS OF CDMA

- **Better Spectrum Efficiency:** Supports more users per MHz of bandwidth.
- **Enhanced Call Quality:** Lower interference improves clarity.
- **Improved Security:** Unique codes make it harder for eavesdropping.

# CHALLENGES OF GSM

- **Limited Global Adoption:** Not widely supported internationally.
- **Carrier Lock-in:** Devices are often tied to specific networks.
- **Complexity:** More difficult and costly to implement compared to GSM.

# GSM vs. CDMA COMPARISON

- **Technology:** GSM uses TDMA; CDMA uses spread-spectrum.
- **SIM Cards:** GSM requires SIM cards; CDMA embeds user data in devices.
- **Global Reach:** GSM has broader global adoption, supporting international roaming.
- **Data Evolution:** GSM led to LTE and global mobile advancements.

# CONCLUSION

- **GSM and CDMA played significant roles in mobile communication.**
- **GSM had wider adoption due to global compatibility and ease of switching devices.**
- **CDMA offered superior efficiency but was regionally limited.**
- **The industry has moved beyond GSM/CDMA towards unified LTE and 5G networks.**