مرکز آموزش نیـــرا سیستم

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GSM

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Introduction

- GSM, which stands for Global System for Mobile Communications, is a standard developed to facilitate communication between mobile devices.
- It was first introduced in the early 1990s and has since become one of the most widely used mobile communication technologies globally.

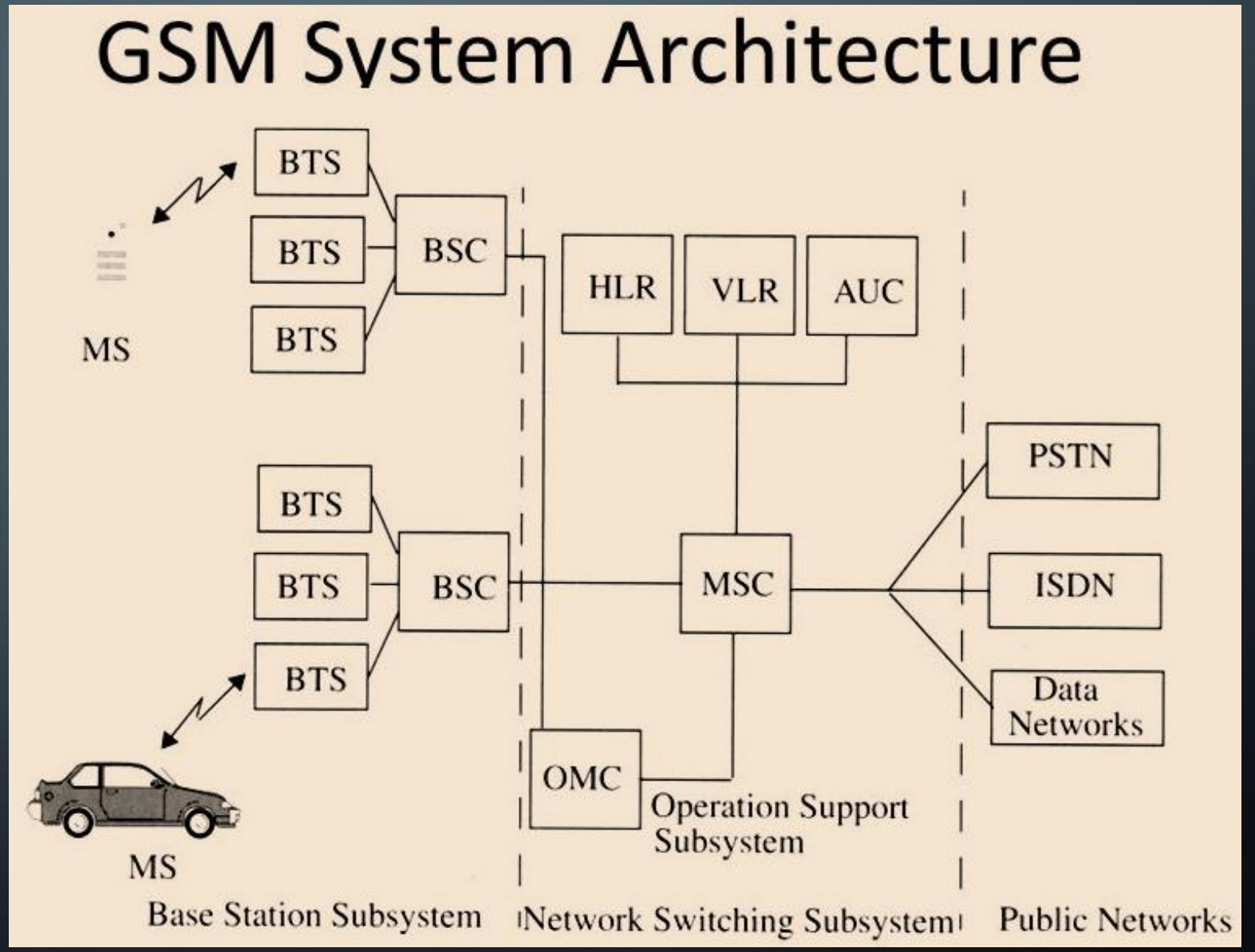
Applications

- **Voice Communication**
  - GSM was initially designed primarily for voice communication. It enables users to make calls to other mobile or fixed-line phones.
- **Short Message Service (SMS)**
  - GSM introduced the widely used Short Message Service, allowing users to send and receive text messages.
- **Data Transfer**
  - GSM also supports data transfer, allowing users to access the internet, send emails, and engage in various data-related activities
- **Roaming**
  - GSM facilitates international roaming, enabling users to use their mobile devices in different countries seamlessly

Generations

- **1G (First Generation)**
  - The original GSM standard, providing basic voice communication services.
- **2G (Second Generation)**
  - Introduced digital encryption for secure communication.
  - Added support for SMS and basic data services.
- **2.5G (GPRS - General Packet Radio Service)**
  - Enhanced data transfer capabilities, enabling faster internet access.
- **3G (Third Generation)**
  - Introduced high-speed data transfer, video calling, and mobile internet.
- **4G (Fourth Generation)**
  - Enhanced data transfer speeds, supporting advanced mobile internet and multimedia services.

Architecture



Frequency Bands

- **GSM (2G) Frequency Bands:**
  - **Europe, Asia, Africa, Middle East:**
    - GSM 900: 890-915 MHz (Uplink), 935-960 MHz (Downlink)
    - GSM 1800 (DCS): 1710-1785 MHz (Uplink), 1805-1880 MHz (Downlink)
  - **North America, South America, Oceania:**
    - GSM 850: 824-849 MHz (Uplink), 869-894 MHz (Downlink)
    - GSM 1900 (PCS): 1850-1910 MHz (Uplink), 1930-1990 MHz (Downlink)
- **4G LTE Frequency Bands:**
  - **Europe, Asia, Africa, Middle East:**
    - LTE Band 3: 1710-1785 MHz (Uplink), 1805-1880 MHz (Downlink)
    - LTE Band 7: 2500-2570 MHz (Uplink), 2620-2690 MHz (Downlink)
  - **North America, South America, Oceania:**
    - LTE Band 4: 1710-1755 MHz (Uplink), 2110-2155 MHz (Downlink)
    - LTE Band 12: 699-716 MHz (Uplink), 729-746 MHz (Downlink)

Base Transceiver Station (BTS)

- **Function**
  - BTS is a key component in the BSS, responsible for the radio communication with mobile devices within its coverage area.
- **Components**
  - Transceiver: Handles transmission and reception of signals.
  - Power Amplifier: Boosts the signal for transmission.
  - Antenna: Facilitates the exchange of signals between the BTS and mobile devices.

GSM Modules

- **Definition:**
  - GSM modules are hardware components that integrate GSM technology into various devices.
  - They enable devices to communicate over GSM networks, providing functionalities like call and SMS capabilities.
- **Applications:**
  - GSM modules are used in various applications, including security systems, industrial automation, healthcare devices, and IoT (Internet of Things) devices.
- **Features:**
  - Compact size, making them suitable for integration into small devices.
  - Support for voice and data communication.
  - Integration with SIM cards for user identification and authentication.

Modules

- **SIMCom**
  - SIM800 Series (2G)
  - SIM7000 Series (4G)
  - SIM8000 Series (5G)
- Quectel
  - MC60 (2G)
  - UG96 (3G)
  - EC200 (4G)