

# **Unit V**

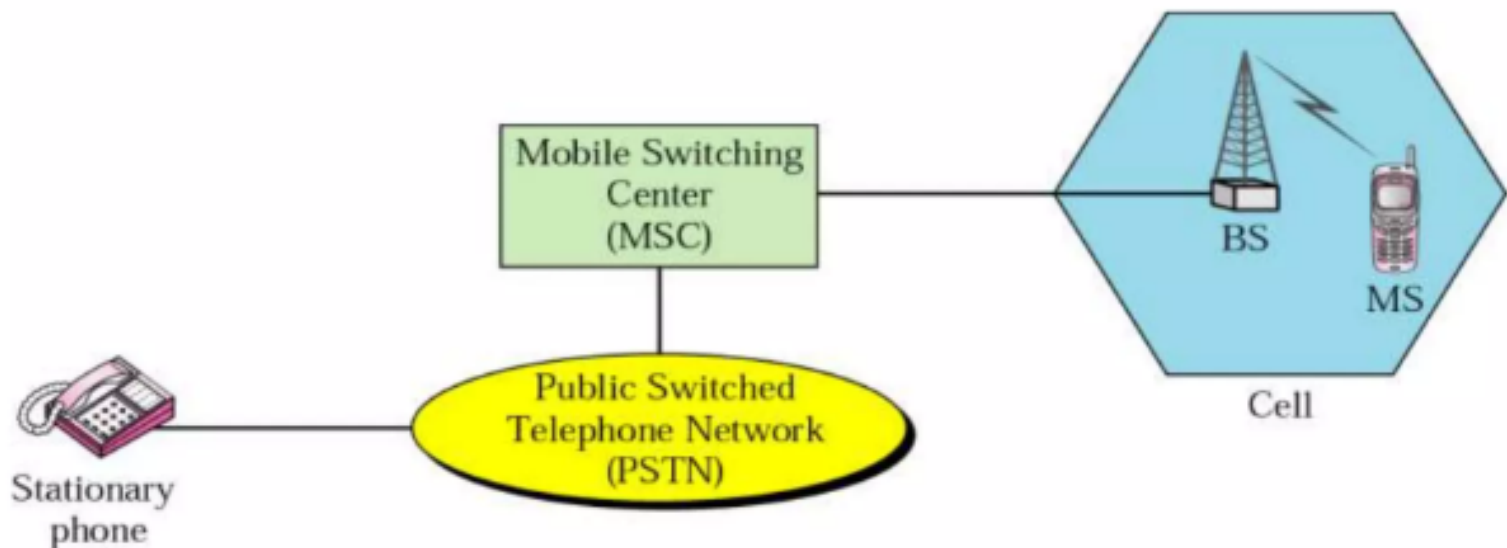
## **Security in Wireless Communication**

# CONTENTS

- Security Issue and challenges in GSM, 1G, 2G, 3G, 4G.
- Multimedia security in 5G and 6G
- Post-quantum cryptography
- Molecular communication
- Visible light communication (VLC)
- Distributed ledger (DL)
- UMTS Security, Bluetooth Security, WEP, WPA2.
- **Wireless Security Tools:** Kismet, URH (Universal Radio Hacker).

# Introduction

- Cellular telephony is designed to provide communications between
- two moving units, called mobile stations (MSs), or
  - between one mobile unit and one stationary unit, often called a land unit.





# First Generation (1G)

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- Voice signal only
- Analogue cellular phones
- Advanced Mobile Phone System (AMPS) – US
- Nordic Mobile Telephony (NMT) –  
EUROPE (Nordic countries, Switzerland, Netherlands,  
Eastern Europe and Russia)



## Second Generation (2G)

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- Voice and data signals
- Digital fidelity cellular phones
- Global System for Mobile Communications(GSM)
- Time Division Multiple Access(TDMA)
- Code Division Multiple Access(CDMA)



## 2.5 G

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- Enhance 2G
- Higher data rates
- General Packet Radio Service(GPRS)
- Enhanced Data rate for GSM Evolution(EDGE)



## Third Generation (3G)

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- Voice, data and video signals
- Video telephony/Internet surfing
- Wideband CDMA(W-CDMA)
- Universal Mobile Telecommunication System(UMTS)



## Fourth Generation (4G)

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- Enhanced 3G/Interoperability protocol
- High speed and IP-based
- 4G, Mobile IP



# Evolution of Digital Cellular Standards

## 2G

World

GSM  
(TDMA)

Japan

PDC  
(TDMA)

U.S.

iDEN  
(TDMA)

U.S.

IS-136  
(TDMA)

U.S., Asia

IS-95A  
(CDMA)

## 2.5G

GPRS

EDGE

## 3G

WCDMA  
(UMTS)

HSPA  
(UMTS)

HSPA+  
(UMTS)

EV-DO  
(CDMA2000)

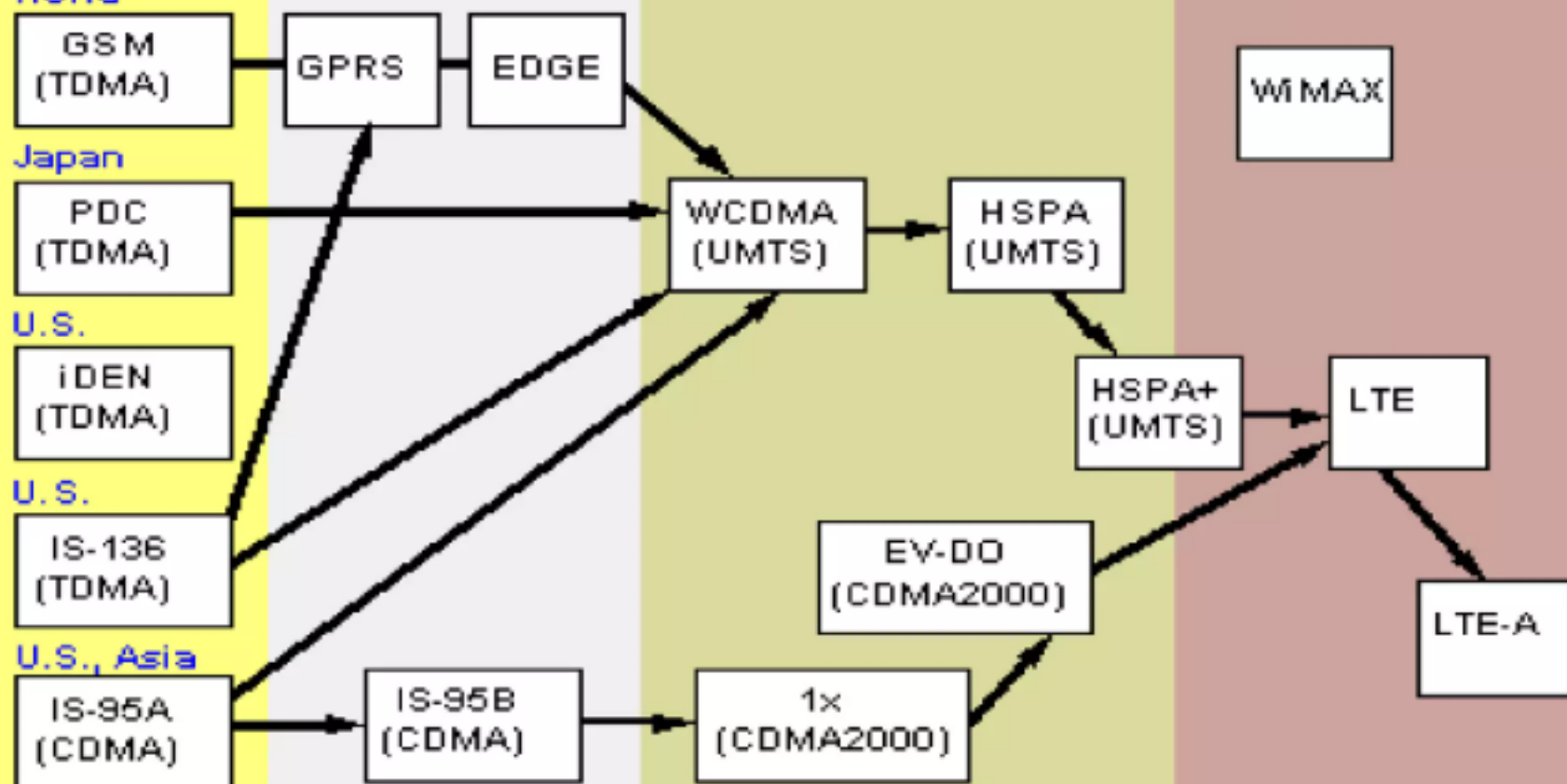
1x  
(CDMA2000)

## 4G

WiMAX

LTE

LTE-A





# Limitations of Cellular Networks

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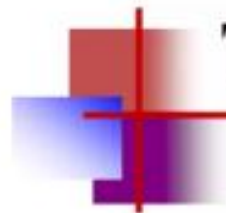
- ➔ Open Wireless Access Medium
- ➔ Limited Bandwidth
- ➔ System Complexity
- ➔ Limited Power
- ➔ Limited Processing Power
- ➔ Relatively Unreliable Network Connection



# Security Issues

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- ➔ Authentication
- ➔ Integrity
- ➔ Confidentiality
- ➔ Access Control
- ➔ Operating Systems In Mobile Devices
- ➔ Web Services
- ➔ Location Detection
- ➔ Viruses And Malware
- ➔ Downloaded Contents
- ➔ Device Security



# Types of Attacks

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- ➔ Denial of Service (DoS)
- ➔ Distributed Denial of Service (DDoS)
- ➔ Channel Jamming
- ➔ Unauthorized Access
- ➔ Eavesdropping
- ➔ Message Forgery
- ➔ Message Replay
- ➔ Man-in-the-Middle Attack
- ➔ Session Hijacking



# Security Recommendations

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- Ensure that data stored in the mobile devices are encrypted and audited.
- Ensure that Mobile devices are configured with a power-on authentication to prevent unauthorized access if lost or stolen.
- Ensure that anti-virus software is installed on the mobile devices.
- Ensure that firewall client is installed on the mobile devices.
- Ensure that Mobile devices are encrypted with strong password.
- Ensure that the data stored in the secondary storage such as Memory Sticks, Data card, removable USB drive are also encrypted.
- Ensure that the mobile device policies are established in the organization and the users are informed about the importance of policies and the means of protecting their information.
- Ensure that periodic backups of mobile devices are done in data server.

# Security Tools for Cellular Telephone

- ❖ Lookout Mobile Security
- ❖ Snap Secure Mobile Security
- ❖ BullGuard Mobile Security 10
- ❖ McAfee Wave Secure
- ❖ Kaspersky Mobile Security 9
- ❖ F-Secure Mobile Security
- ❖ Avast! Mobile Security
- ❖ Norton Mobile Security Lite and so on...