MODULE 7: UNDERSTANDING WIRELESS AND MOBILE NETWORKS

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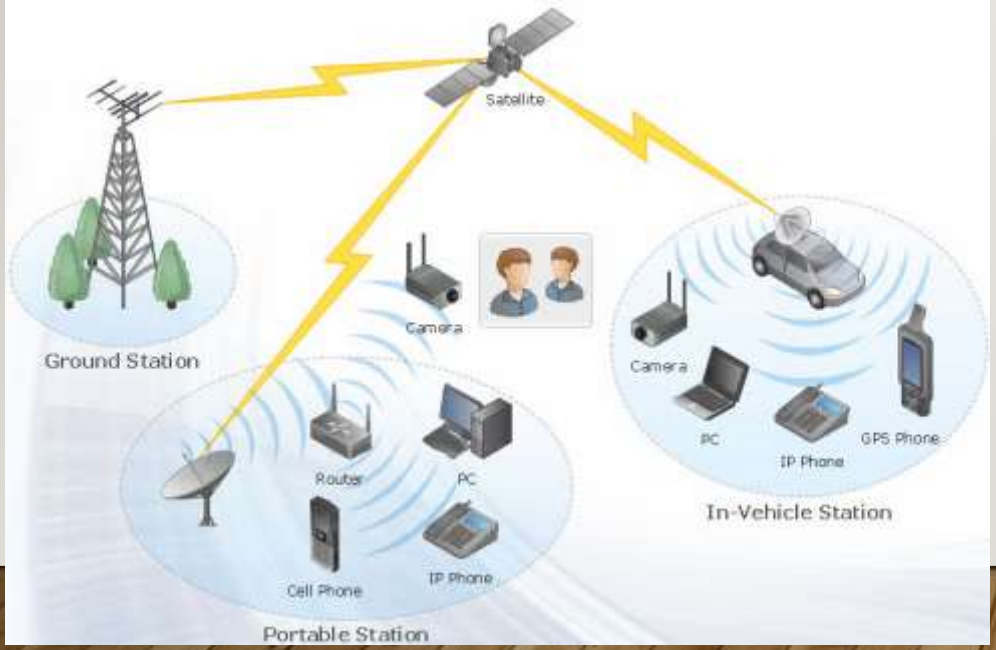
OVERVIEW

- Wireless Communication
- Mobility
- Components of Wireless Networks
- Wireless LAN (Wi-Fi)
- Cellular Networks (4G/5G)
- Practical Scenario: Secure Home Network

WIRELESS COMMUNICATION

- Transmitting data over electromagnetic waves
- Flexibility and mobility
- No physical cables needed



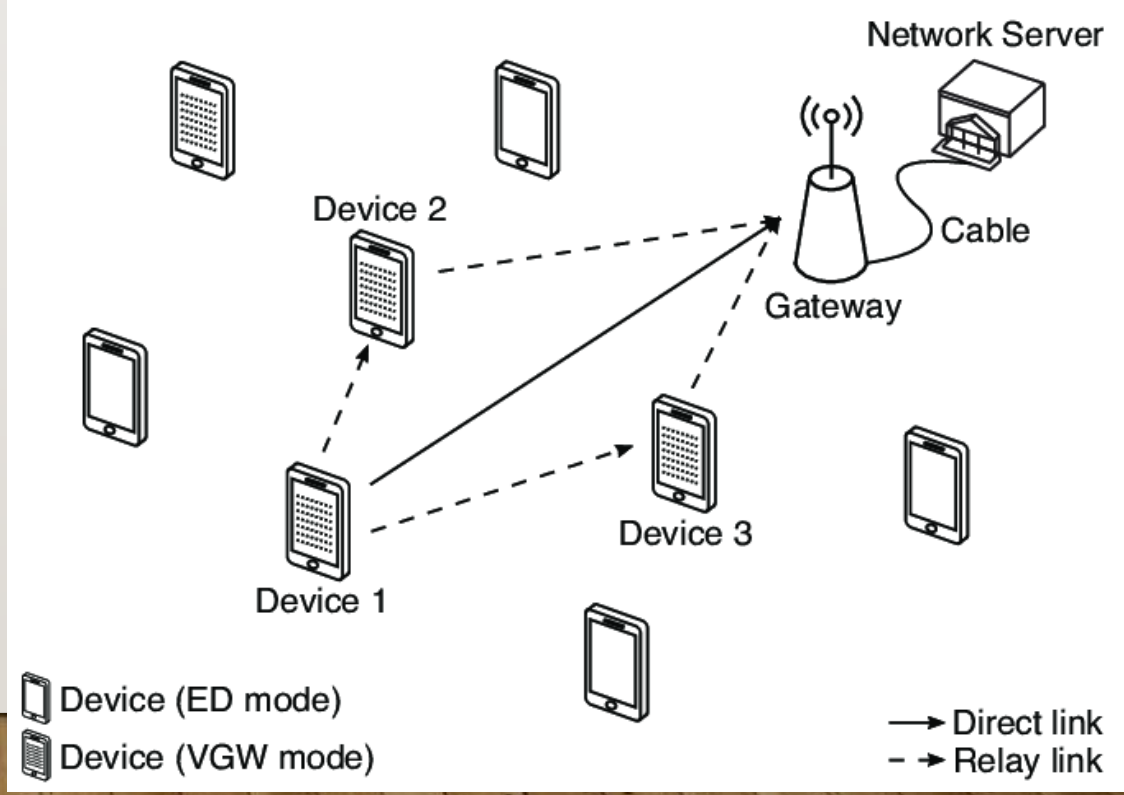
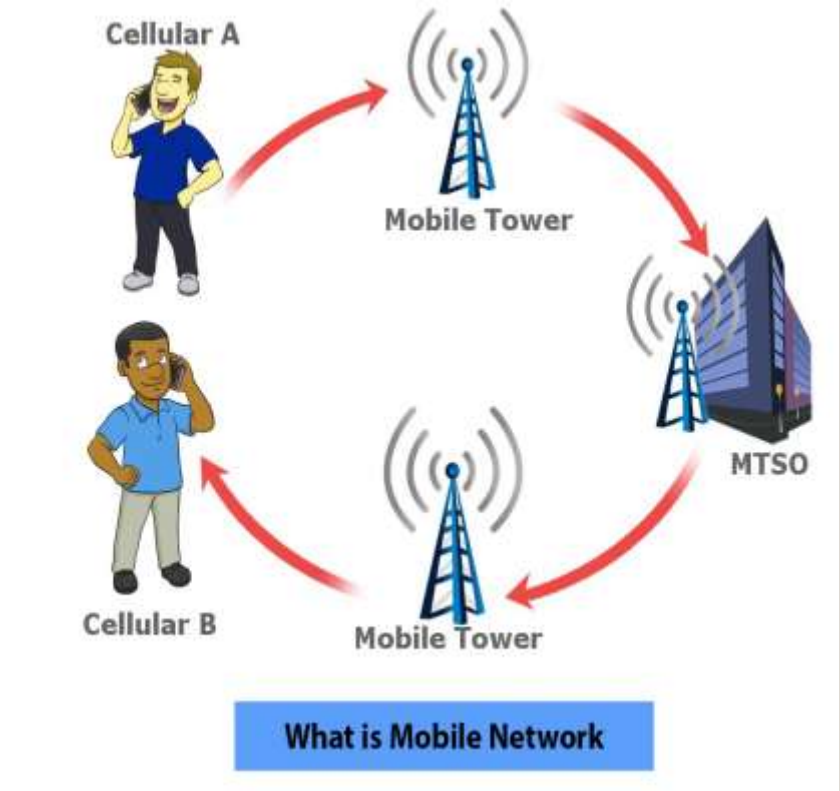


ILLUSTRATION OF MOBILE USERS SWITCHING NETWORKS

- Ability to move while maintaining connectivity
- Changing points of attachment
- Crucial for mobile devices



COMPONENTS OF WIRELESS NETWORKS

- Wireless Hosts (e.g., smartphones, laptops, IoT devices)
- Base Stations (e.g., access points, cell towers)
- Wireless Links

WIRELESS LAN (WI-FI)

- IEEE 802.11 standards
- Different data rates and ranges
- Dual-band routers (2.4 GHz and 5 GHz)

Standard	Frequency	Maximum Speed	Backwards compatibility
802.11	2.4 GHz	2 Mbps	-
802.11a	5 GHz	54 Mbps	-
802.11b	2.4 GHz	11 Mbps	-
802.11g	2.4 GHz	54 Mbps	802.11b
802.11n	2.4 and 5 GHz	600 Mbps	802.11a/b/g
802.11ac	5 GHz	1300 Mbps	802.11a/n
802.11ad	2.4 GHz, 5 GHz and 60 GHz	7 Gbps	802.11a/b/g/n/ac

PRACTICAL SCENARIO: SECURE HOME NETWORK

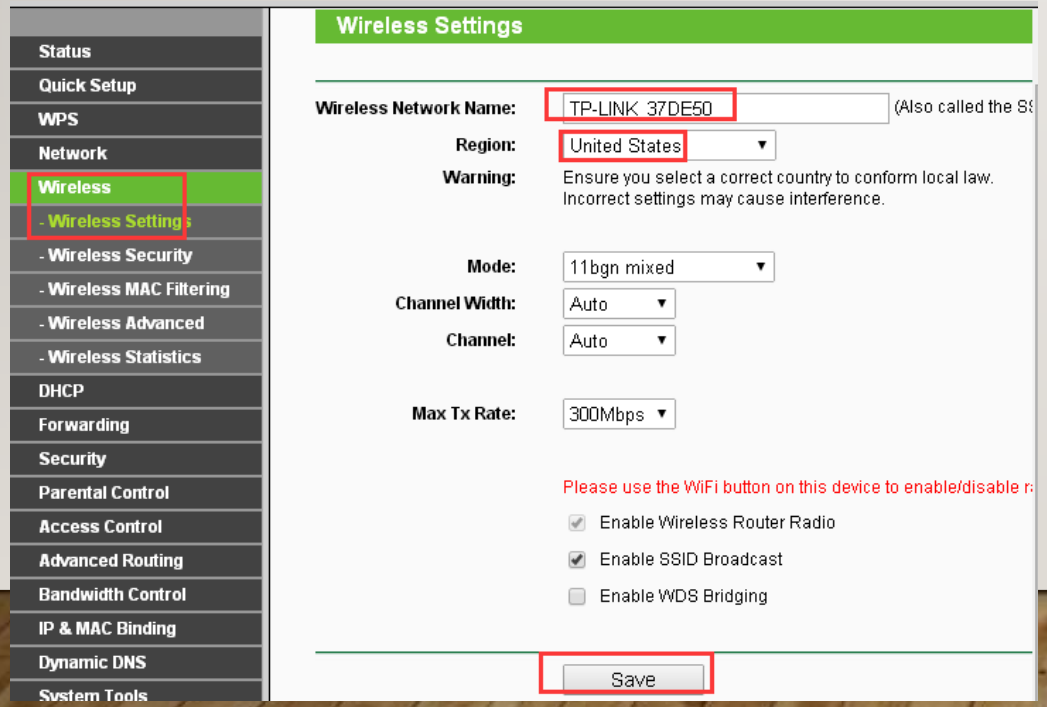
- Choosing the right equipment
- Setting up the network
- Security measures
- Optimizing performance
- Managing devices

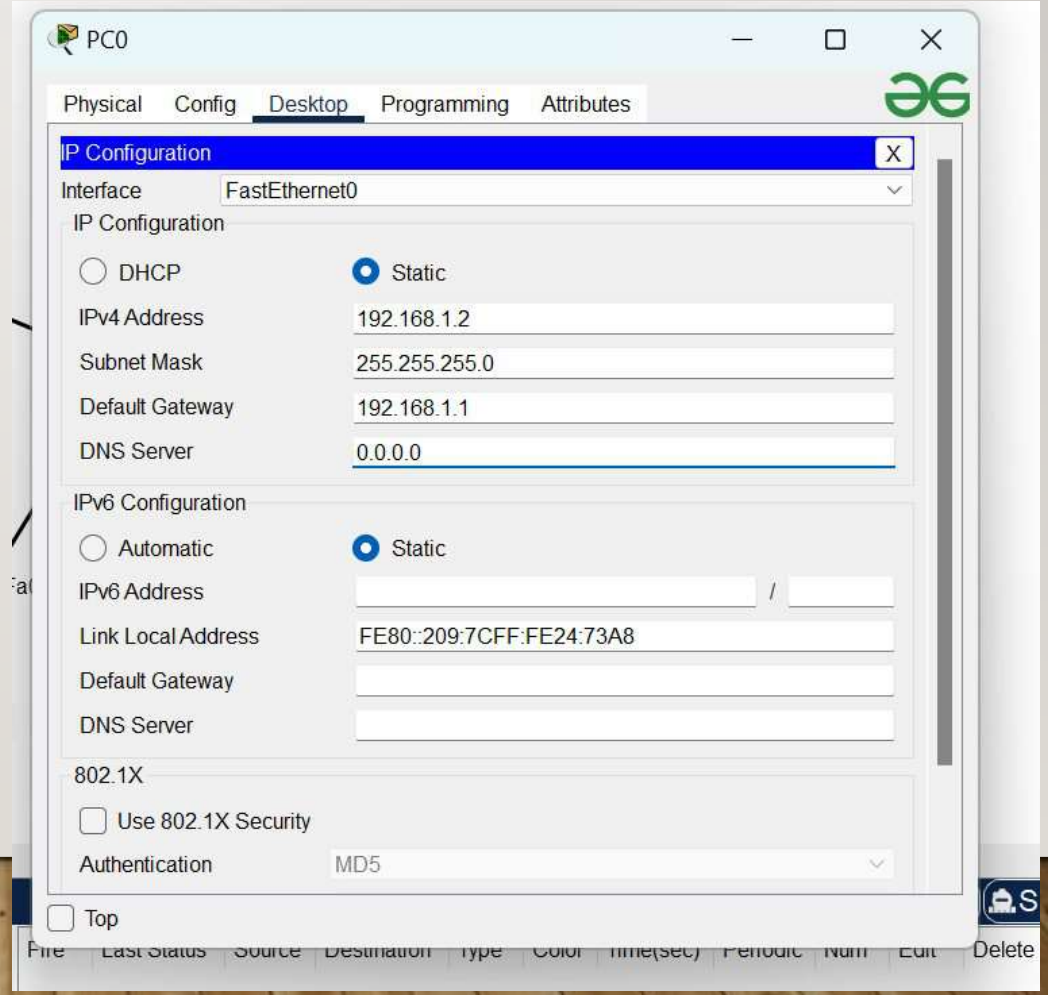
CHOOSING THE RIGHT EQUIPMENT

- Dual-band router (Wi-Fi 6 preferred)
- Additional access points for coverage

SETTING UP THE NETWORK

- Connect router to ISP modem
- Configure SSIDs for 2.4 GHz and 5 GHz
- Use strong, unique passwords



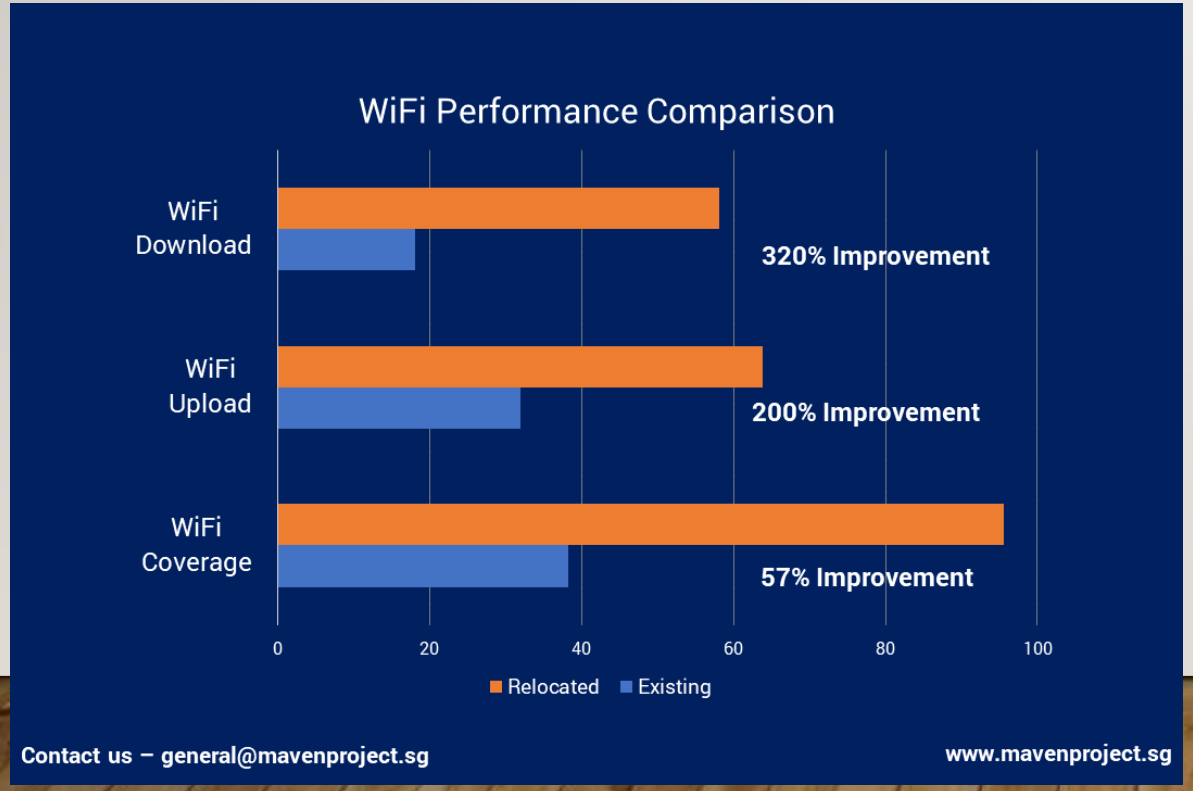


SECURITY MEASURES

- Enable WPA3 encryption
- Create strong passwords
- Set up a guest network
- Enable MAC filtering

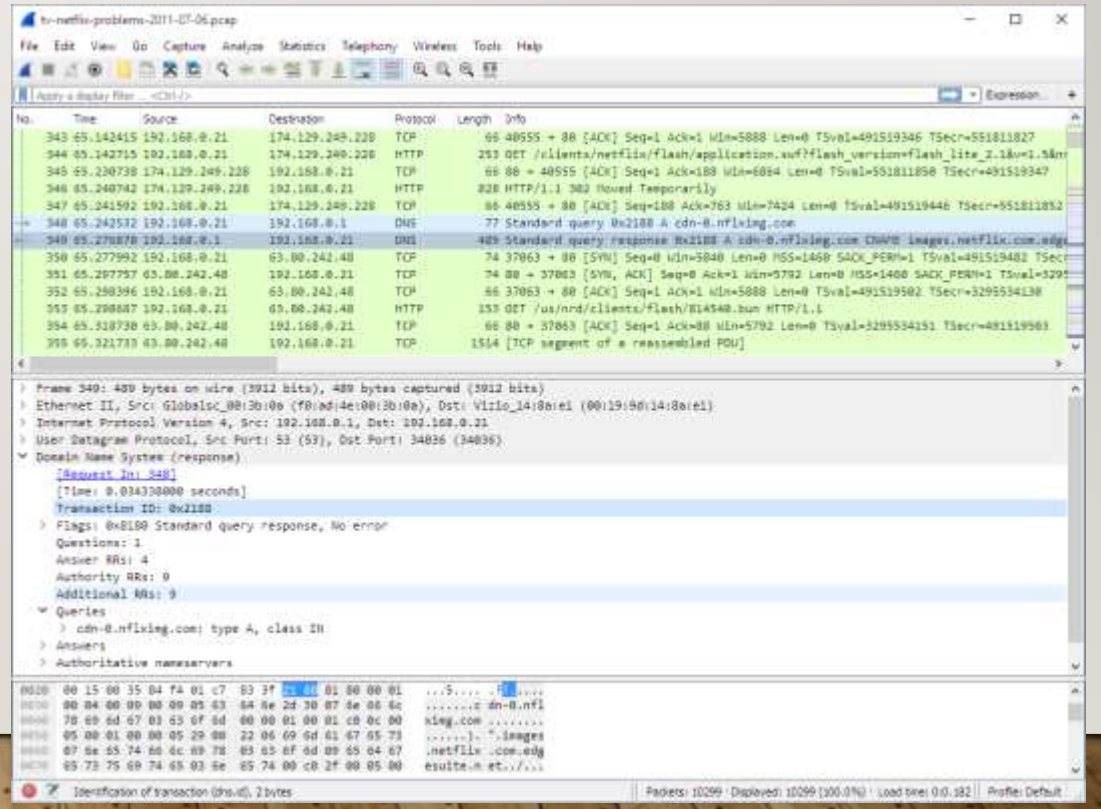
OPTIMIZING PERFORMANCE

- Select least congested channels
- Adjust QoS settings



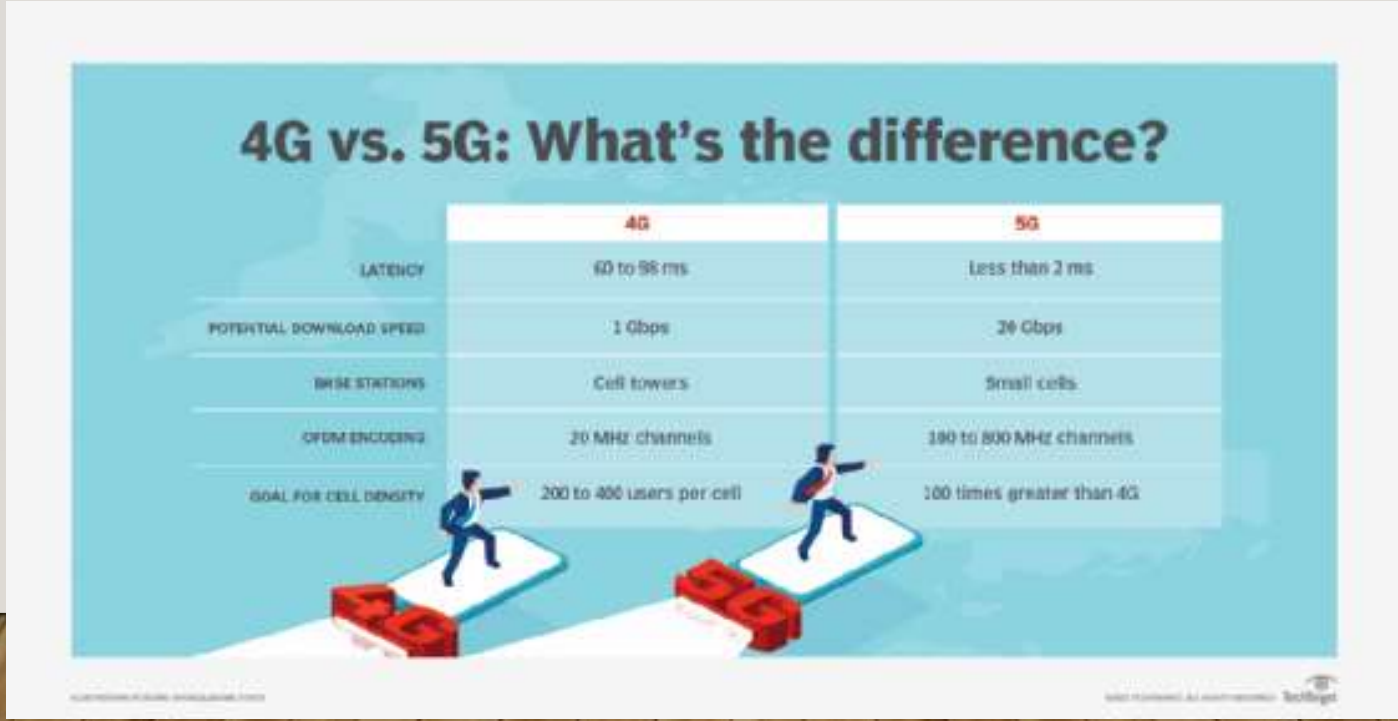
MANAGING DEVICES

- Regular firmware updates
- Network monitoring tools
- Periodic reviews of network settings



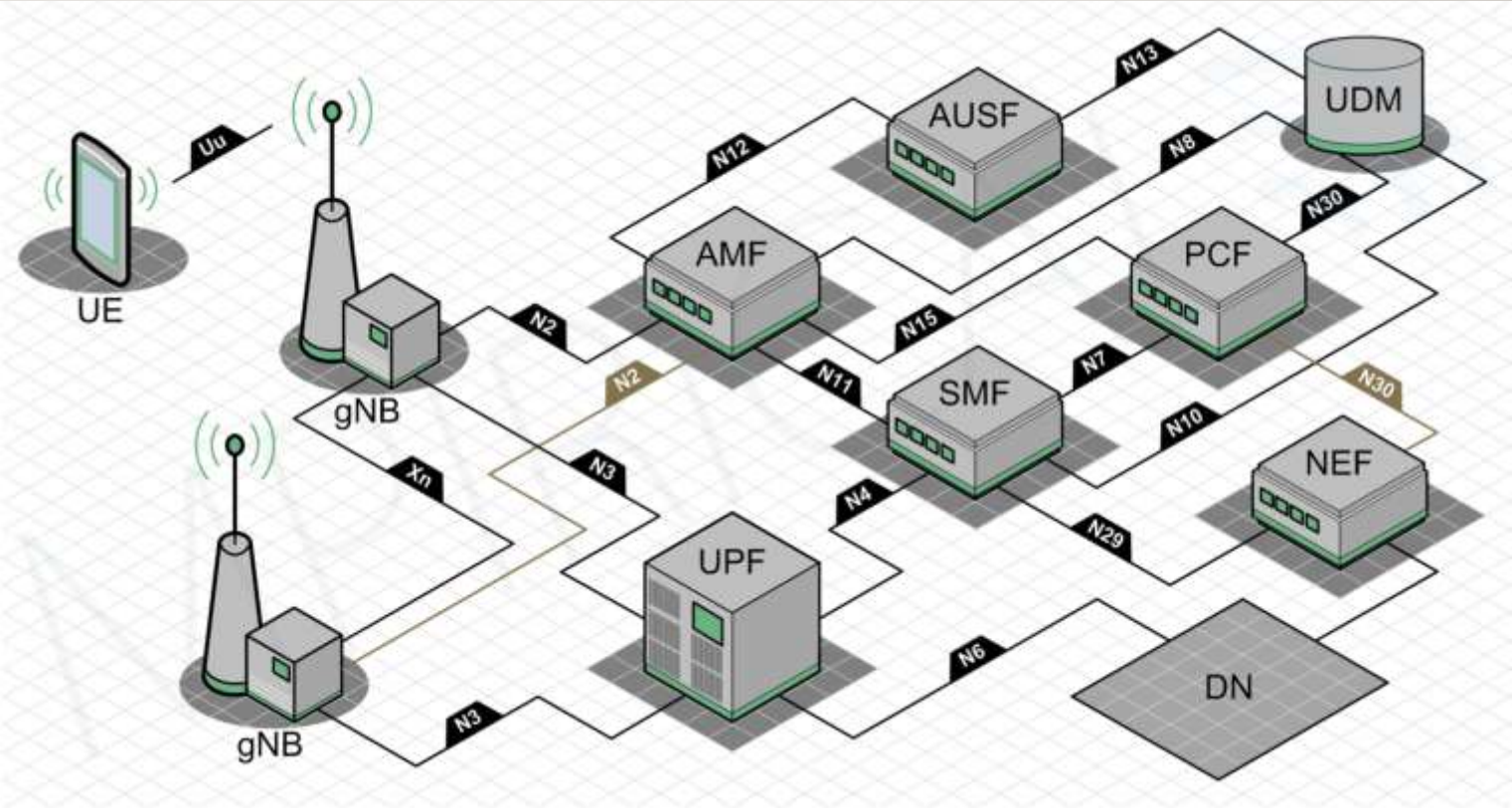
4G AND 5G CELLULAR NETWORKS

- 4G: High-speed mobile internet
- 5G: Higher speeds, lower latency, greater capacity



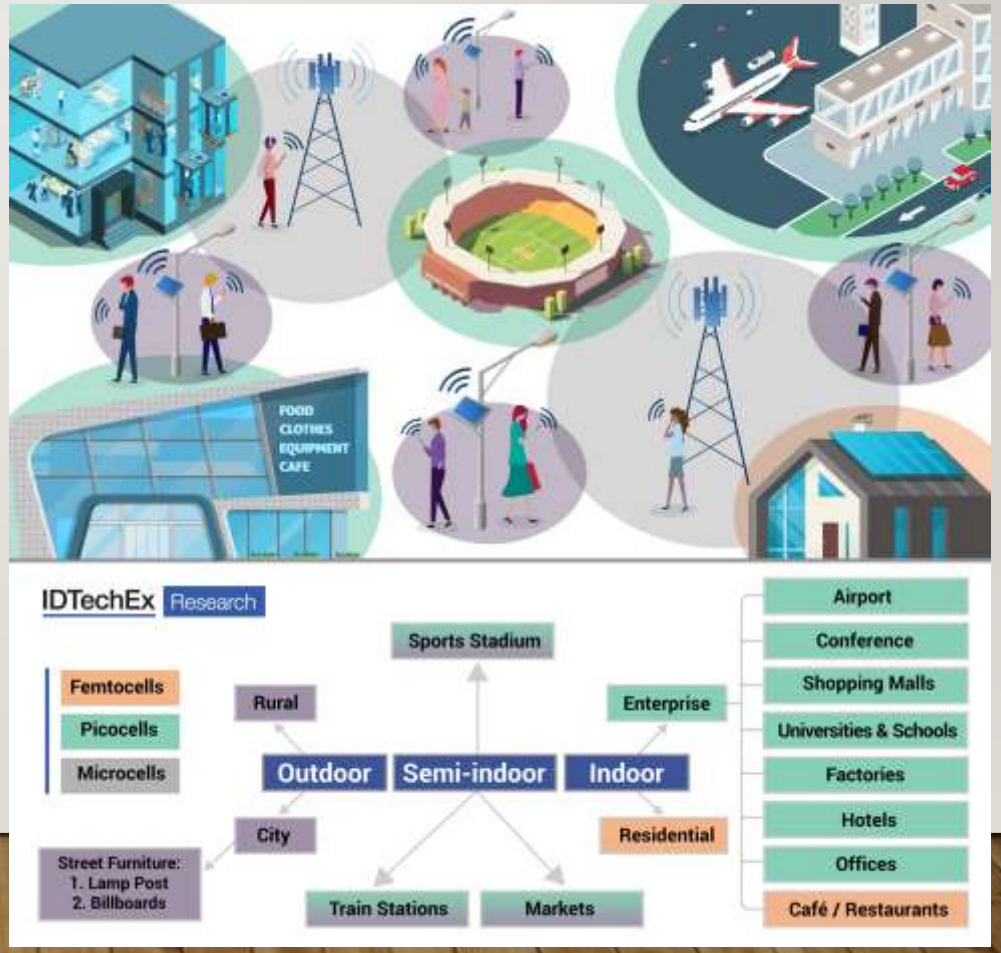
5G TECHNOLOGIES

- Higher frequency bands (millimeter waves)
- Massive MIMO
- Advanced beamforming



POTENTIAL APPLICATIONS OF 5G

- Smart cities
- Autonomous vehicles
- Remote healthcare
- Industrial IoT



CONCLUSION

- Recap
  - Wireless and mobile network
  - Wireless LAN (WIFI)
  - Setting up a secure home network
  - 4G and 5G cellular network
- Always implement best practices

THANK YOU