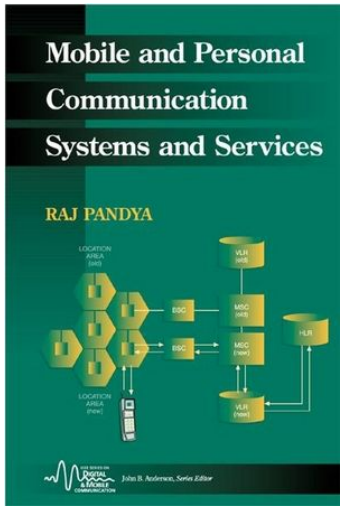
Part - III

Principles of Electronic Communication

Chapter- 10
Introduction to Mobile Communication

Reference:

Raj Pandya, “Mobile And Personal Communication Services And Systems”, Wiley-IEEE Press,1999

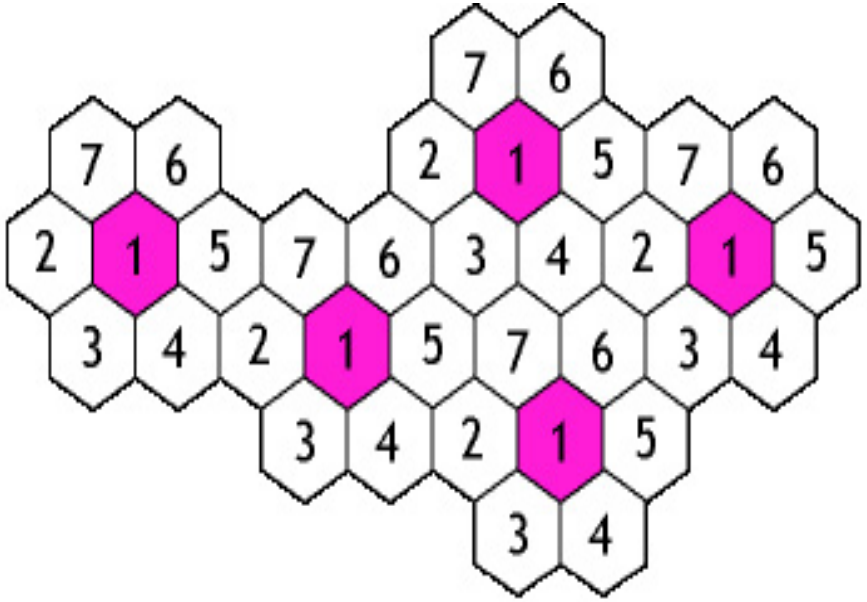


Introduction to Mobile Communication

Objectives:

- To describe principle behind cellular mobile communication
- To Explain the various multiple access techniques used in cellular systems
- To discuss the GSM Architecture

- Adds mobility
- Frequency reuse



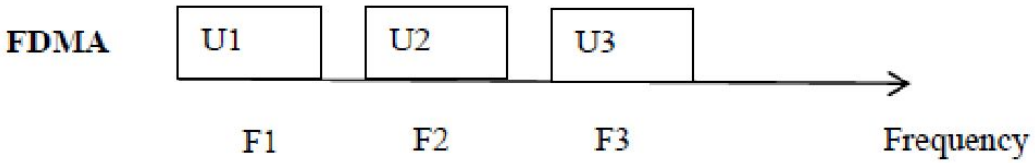
Basic cellular system

Introduction to Mobile Communication

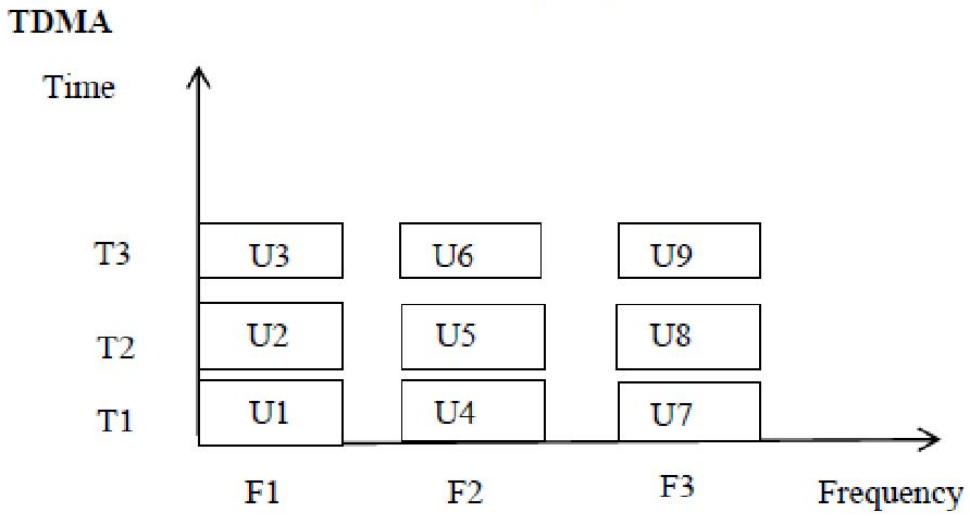
- Mobile phone networks are divided into thousands of overlapping, individual geographic areas or cells each with a Base station
- Each mobile communicates via radio with one or more base stations
- Each mobile contains a transceiver (transmitter and receiver), an antenna, and control circuitry

- Uplink channel
- Downlink channel
- Forward and reverse control channel
- Hand off
- Roaming

Multiple access techniques

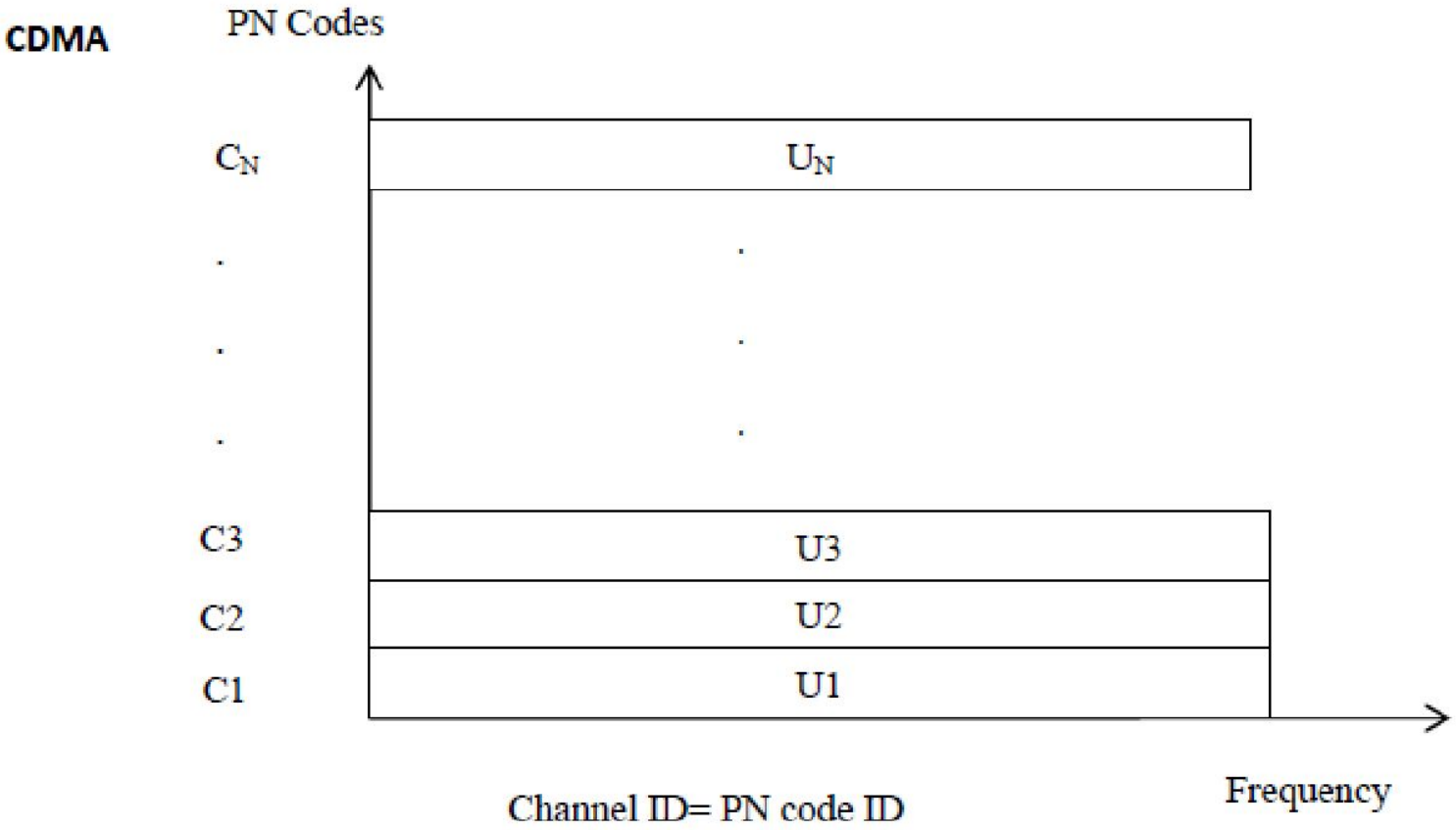


Channel ID = Frequency slot ID



Channel ID = Frequency slot ID + time slot ID

Multiple access techniques



Source: Mobile and Personal communication systems and services by Raj Pandya

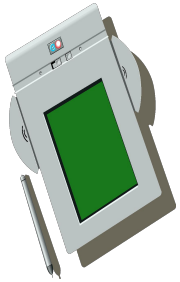
Mobile Devices

Pager
- receive only
- tiny displays
- simple text messages

PDA
- simple graphical displays
- character recognition
- simplified WWW

Laptop
- fully functional
- standard applications

Sensors, embedded controllers



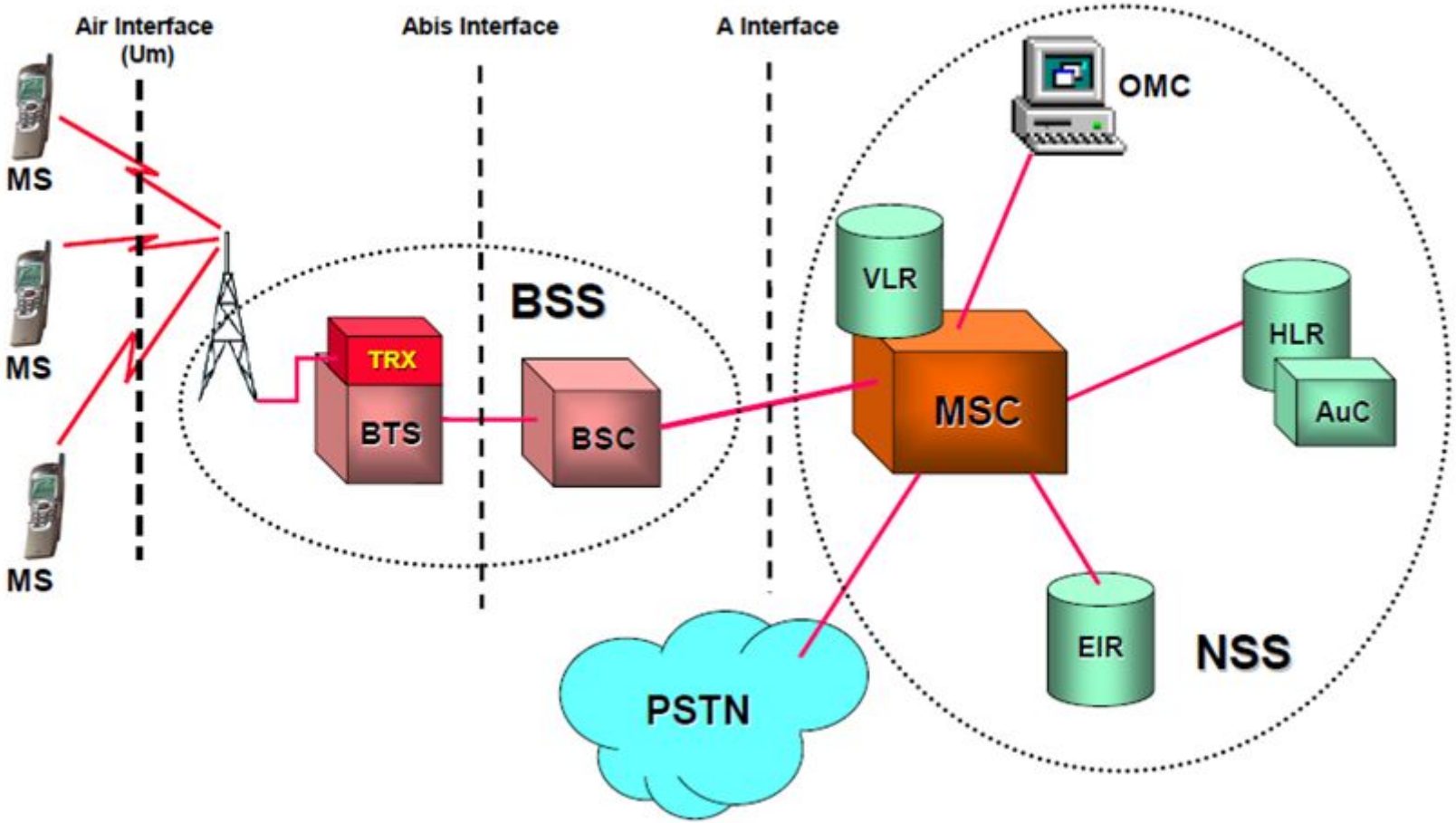
Mobile phones
- voice, data
- simple text displays

Palmtop
- tiny keyboard
- simple versions of standard applications

Features:

- Higher digital voice quality
- Low cost alternatives to making calls such as SMS
- Ability to deploy equipment from different vendors
- GSM allows network operators to offer roaming services

GSM Architecture



GSM Architecture

Mobile Station(MS):

- Mobile Equipment (ME)
- Subscriber Identity Module (SIM)

Base Station Subsystem (BSS):

- Base Transceiver Station (BTS)
- Base Station Controller (BSC)

Network Subsystem(NSS):

- Mobile Switching Center (MSC)
- Home Location Register (HLR)
- Visitor Location Register (VLR)
- Authentication Center (AUC)
- Equipment Identity Register (EIR)

Summary

In this module we have learnt:

- Basic concept of cellular mobile communication
- Commonly used multiple access techniques in cellular systems such as frequency division multiple access, time division multiple access and code division multiple access
- Architecture of GSM system
- Importance of base station subsystem and network subsystem
- The components of network subsystem such as HLR, VLR, AuC and EIR

Self test

- How call set up takes place between two mobile subscribers?
- Explain the need for cellular concept in mobile communication.
- Explain frequency reuse concept in cellular systems.

Exercises

- Compare different generations of cellular mobile communication in terms of underlying modulation schemes, data rate, and applications offered etc.
- Compare CDMA with that of GSM system.