

## Module II: Radio Network Planning

30 kwietnia (czwartek)

Godz. 16:15 – 18:15

### Chapter 1: GSM Radio Network Planning Introduction

- Definition of the radio network system
- Cellular radio network
- GSM System
- Radio Propagation Environment (Angular spread, multipath propagation, delay spread, fast and slow fading, propagation slope)
- Radio System Planning Process
  - Radio system planning phases
- GSM power budget
  - Base station site (BTS)
  - Mobile station (MS)
  - BTS/MS powers/sensitivities
  - Combiners
  - Base station antennas
  - BTS/MS cables and connectors
  - Power budget balance
  - Power budget maximizing

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### Chapter 2: GSM Coverage, Capacity and Frequency Planning

- GSM coverage planning
  - Location probabilities and fading margins
  - Building and vehicle penetration
  - Other losses and margins
  - Radio propagation prediction
- GSM capacity planning
  - Capacity planning principles
  - Traffic models
  - Erlang B-tables
  - Traffic and signalling channels
  - Estimating the capacity
  - Frequency reuse factor
  - Capacity enhancement methods

7 maja (czwartek)

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### Chapter 2: GSM Coverage, Capacity and Frequency Planning

- Frequency planning criteria
  - Frequency band splitting
  - Frequency band grouping
  - Intermodulation
- Interference analysis matrix
- Automatic frequency planning (AFP)
- Software features in frequency planning
  - Frequency hopping
  - Discontinuous transmission (DTX)
  - Power control
  - Multilayer radio network

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- Demonstrations
- Exercises session

14 maja (czwartek)

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### Chapter 3: UMTS Radio Network Planning Introduction

- UMTS planning process
- Dimensioning
- Configuration planning
  - Receiving end parameters
  - Transmitting end
  - Isotropic path loss

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### Chapter 4: UMTS Coverage, Capacity and Topology Planning

- Coverage planning
  - Downlink power allocation
  - Common Pilot Channel (CPICH) power allocation
  - DCH coverage
  - Power budget for different services
- Capacity planning
  - Load parameters
  - Frequency reuse efficiency
  - Uplink load
  - Downlink load
- Coverage and capacity tradeoffs and limitation
  - Coverage limited scenarios
  - Capacity limited scenarios
- Coverage and capacity enhancements
  - Sectoring
  - Repeaters
  - Additional carriers/scrambling codes
  - Beamforming
  - Microcells

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### Chapter 4: UMTS Coverage, Capacity and Topology Planning

- Topology planning
  - Site location
  - Hexagonal macrocellular planning
  - 2G/3G layer interworking
  - Co-siting/locating
  - Sectoring
  - Coverage overlapping

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### Chapter 5: Laboratory: Radio Network Planning Practical Cases

- eEPOS – radio network planning tool