

# 3GPP UMTS FDD Physical Layer

## SYLLABUS

### Mobile Communication Generations

- 1st generation analog mobile
- 2nd generation mobile GSM
- 3rd generation UMTS, IMT2000
- 3G partnership project (3GPP)

### Spread Spectrum Principles

- Time/frequency/code DMA (TDMA/FDMA/CDMA)
- Spread spectrum techniques
- Coding gain
- Direct sequence CDMA
- Multiple access interference
- PRBS sequence generation
- OVSF- orthogonal variable spreading function
- Walsh codes and multipath
- The near far problem
- Power control
- The rake receiver
- Multiuser detection

### 3GPP Frequency Division Duplex

- 3GPP standard organisation
- Uplink and downlink architectures
- Bits, chips, slots and radio frames

### 3GPP Baseband Processing

- CRC
- Convolutional/turbo coding
- Interleaving
- Rate matching
- Transport channel multiplexing
- Spreading (channelisation & scrambling)
- Uplink/downlink channelisation codes
- Uplink/downlink scrambling codes
- Pulse shaping
- Modulation

### 3GPP Channelisation and Scrambling

- Uplink spreading: one DPDCH
- Uplink spreading: multiple DPDCHs
- Uplink scrambling code generation
- Uplink channelisation codes
- Uplink spreading: HPSK modulation
- Downlink DPCH spreading
- Downlink scrambling code generation
- Downlink scrambling codes organisation
- Downlink channelisation codes

### Physical Channels for 3GPP FDD

- Transport channels
- Mapping of transport channels into physical channels
- Uplink physical channels
- Downlink physical channels
- Cell search procedure
- Slot synchronisation
- Frame synchronisation
- Scrambling code identification

### 3G Evolution

- UMTS Release 5: HSDPA
- HSDPA architecture
- Fast user scheduling
- Fast hybrid -ARQ
- High speed transport channels
- High speed physical channels
- UMTS Release 6: HSUPA
- UMTS Release 8: Long term evolution (LTE)

### Propagation Channels

- Time & frequency channel dispersion
- AWGN and Multipath Propagation Channels
- Delay Spread Values and Time Variations
- Loss of orthogonality in CDMA signals
- Fast and slow fading environments
- Complex baseband multipath channels

### DSP Baseband Communications Review

- Noise in communication systems
- Pulse shaping / matched filtering
- Sigma delta and bandpass sigma delta
- Channel equalisation / inverse system identification

### Modulation and Mixing Strategies

- AM/FM/PM modulation
- ASK/PSK/FSK signalling
- Quadrature amplitude modulation (QAM)
- Complex notation and representation

## MORE DETAILS

Should you have any further questions about this or any other Steepest Ascent courses, or if you are interested in an on-site presentation please contact:

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