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GSM Air Interface

Course Description

This course builds on the GSM and GPRS System Engineering course and focuses on the specifics associated with the air interface when supporting voice and SMS services. This includes analysis of the various physical and logical channels and the associated multiframes and protocols. The course then moves on to explain the key network procedures from an air interface perspective before culminating in analysis in how mobility is supported in terms of cell re-selection, measurements, reports and handovers.

Prerequisites: GSM and GPRS System Engineering would be advantageous.

6

Hours learning
(OnlineAnytime)

6

CPD Learning
Credits



Level: 3
(Advanced)

This course will contain the following sections:

1. The GSM Air Interface

Topic areas covered include:

- Frequency Allocations:
 - GSM900, GSM1800, GSM1900 and GSM850.
- Frequency Reuse.
- Cell Sectorization.
- Air Interface Physical Layer:
 - GMSK.
 - TDMA.
 - Radio, Physical and Logical Channels.
- 26 Frame Multiframe:
 - TCH, SACCH, FACCH, Idle.
 - Half Rate Channels.
- 51 Frame Multiframe:
 - FCH, SCH, BCCH, CCCH, RACH.
- 102 Frame Multiframe:
 - SDCCH.
- Combined Multiframe.
- Burst Structures:
 - Frequency Correction, Synchronization, Access, Normal, Dummy.
 - Logical Channels to Burst Format Mapping.

2. GSM Air Interface Protocols

Topic areas covered include:

- Introduction:
 - Dedicated Signalling.
 - Common Signalling.
- DTAP (Direct Transfer Application Part):
 - Mobility Management.
 - Call Control.
- Radio Resource.
- LAPDm (Link Access Protocol on Dm Channel):
 - LAPDm Control Field.
 - Link Layer Procedures.
- Channel Coding and Interleaving:
 - Enhanced Full Rate Codec.
 - Adaptive Multi Rate Codec.
 - Interleaving.

3. GSM Air Interface Procedures – Part 1

Topic areas covered include:

- Introduction.
- Frequency Synchronization:
 - Measurements for Stored List Cell Selection.
 - Frequency Correction Channel.
- Time Synchronization:
 - Base Station Identity Code.
 - TDMA Frame Number.
 - System Information.

6

Hours learning
(OnlineAnytime)

6

CPD Learning
Credits



OnlineAnytime

GSM Air Interface Procedures – Part 1 (cont.)

- Cell Selection:
 - Path Loss Criterion C1 Calculation.
 - C1 Calculation.
- Channel Request and Immediate Assignment:
 - Common Random Reference.
- Location Update.

4. GSM Air Interface Procedures – Part 2

Topic areas covered include:

- Mobile Originated Call Setup:
 - TCH Assignment.
- Mobile Terminated Call Setup.
- SMS Operation:
 - SMS Protocol Layers.
 - Mobile Originated SMS.
 - Mobile Terminated SMS.
- Supplementary Services:
 - Supplementary Service Actions.
 - Supplementary Service Procedures.
 - Call Related Supplementary Service Procedures.
 - Call Independent Supplementary Service Procedures.
- Measurement Reporting and Power Control:
 - Measurement Report Format and Contents.
 - Power Control.

5. GSM Air Interface Mobility

Topic areas covered include:

- Mobility Management:
 - GSM Idle State.
 - GSM Dedicated State.
- Idle Mode Procedures:
 - Cell Reselection:
 - C2 Calculation.
 - C1 Path Loss and C2 Reselection Criteria.
 - Location Area Update.

GSM Air Interface Mobility (cont.)

- Dedicated Mode Procedures:
 - Measurement Reporting.
 - Handover Triggers:
 - Thresholds and P/N Values.
 - Handover Margin.
 - Handover Procedure:
 - Non Synchronized Handover.
 - Pseudo Synchronized Handover.
 - Finely Synchronized.
 - Pre Synchronized.



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