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GSM and GPRS System Engineering

Course Description

GSM and GPRS remain the foundation technologies for many mobile networks worldwide, offering voice and data services through globally standardized network infrastructures. This course explores the network architecture for both circuit and packet switched services, detailing the air interface and the initial procedures required for network access. Network usage is also explained, showing how calls, texts and data sessions are established and maintained as the subscriber moves around the network.

This course has no prerequisites.

2 days
(LiveOnsite,
LiveOnline)

12 hours
learning
(OnlineAnytime)

12

CPD Learning
Credits



Level: 2
(Intermediate)

This course will contain the following sections:

1. GSM and GPRS Architecture

Topic areas covered include:

- The 3GPP Network Architecture:
 - Terminal Equipment:
 - MS, ME, SIM.
 - The GSM EDGE Radio Access Network:
 - BTS, BSC, PCU.
 - The Core Network – Circuit Switched:
 - MSC, GMSC, VLR, Echo Cancellers, TRAU.
 - The Core Network – Packet Switched:
 - SGSN, GGSN.
 - Databases:
 - HLR, AuC, EIR.
 - Intelligent Networks and CAMEL:
 - gsmSCF, gsmSRF, gsmSSF, gprsSSF.
- Protocols and Interfaces:
 - Circuit Switched Control Plane:
 - RR, DTAP, BSSAP, BSSMAP, SCCP, MAP, CAP, INAP.
 - Packet Switched Control Plane:
 - MAC, RLC, LLC, SDCCH, BSSGP, NS, GTP, MAP.

2. GSM and GPRS Air Interface

Topic areas covered include:

- Frequency Allocation:
 - GSM900, GSM1800, GSM1900, GSM850.
- Frequency Reuse:
 - Cell Sectorization.
- Air Interface Physical Layer:
 - Modulation Techniques.

GSM and GPRS Air Interface (cont.)

- Time Division Multiple Access:
 - Radio, Physical and Logical Channels.
- 26 Frame Multiframe:
 - TCH, SACCH, FACCH, Half Rate Channels.
- 51 Frame Multiframe:
 - FCCH, SCH, BCCH, AGCH, PCH, RACH.
- 102 Frame Multiframe:
 - SDCCH.
- Base Site Configuration.

3. GSM and GPRS Initial Procedures

Topic areas covered include:

- Mobility Management:
 - Location Areas and Routing Areas.
 - GSM Mobility Management States:
 - Off, Dedicated, Idle.
 - GPRS Mobility Management States:
 - Idle, Ready, Standby.
- Initial Procedures:
 - Power On:
 - Frequency Synchronization, Time Synchronization, System Information.
 - Cell Selection:
 - C1 Calculation.
 - Circuit Switched Attach (IMSI Attach):
 - MSC Pooling.
 - Packet Switched Attach:
 - SGSN Pooling.
 - Combined Attach.
 - Cell Re-selection:
 - C2 Calculation.
 - Location Area and Routing Area Updates.

12

**CPD Learning
Credits**

ITP

**ITP accredited
course**



**LiveOnsite, LiveOnline,
OnlineAnytime**

GSM and GPRS Initial Procedures (cont.)

- A Flex:
 - Pool Areas, NRI, Load Balancing, Load Redistribution.

4. GSM and GPRS Security

Topic areas covered include:

- Authentication:
 - GSM Authentication Procedure.
 - GPRS Authentication Procedure.
- Encryption:
 - GSM Encryption Process.
 - GPRS Encryption Process.

5. GSM Circuit Switched Operation

Topic areas covered include:

- Mobile Originated Call Setup Procedure:
 - Core Network Signalling – ISUP.
 - Core Network Signalling – BICC.
 - Disconnect.
- Mobile Terminated Call Setup Procedure:
 - Roaming.
- Codecs:
 - PCM, EFR, HR, AMR.
- Text Messaging:
 - Mobile Originated Text Messaging.
 - Mobile Terminated Text Messaging.
 - Text Messaging Failures.

6. GPRS Packet Switched Operation

Topic areas covered include:

- Session Management.
- PDP Context Activation Procedure:
 - SS Packet Flow Context.
 - Secondary PDP Context Activation:
 - Traffic Flow Templates, Packet Filters.
- 2G Data Transfer:
 - Medium Access:
 - Dynamic Allocation, Extended Dynamic Allocation, Exclusive Allocation.

GPRS Packet Switched Operation (cont.)

- Uplink Data Transfer.
- Downlink Data Transfer.
- 2G Modes of Operation:
 - Class A, Class B and Class C.
 - Dual Transfer Mode.
 - Suspend and Resume.

7. GSM and GPRS Mobility

Topic areas covered include:

- GSM Mobility:
 - GSM Measurement Reports.
 - Handover Triggers:
 - Thresholds and P/N Values.
 - Handover Margins.
 - Types of Handover:
 - Non Synchronized.
 - Pseudo Synchronized.
 - Finely Synchronized.
 - Pre Synchronized.
- GPRS Mobility:
 - Network Control:
 - NC0, NC1, NC2.
 - Cell Update Procedure.
 - Routing Area Update Procedure.



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