

هذا البرنامج التدريبي يقدم صورة شاملة عن تكنولوجيا الـ GSM، وطبيعة عملها ومكوناتها. البرنامج مصمم لإعطاء المتدرب المعلومات الضرورية التي تؤهله للتعامل مع هذه التكنولوجيا بصورة عملية صحيحة وكفاءة عالية لضمان أداء عالي للشبكة.

**Course Reference:** GSM-05A

**Level:** Introductory/Intermediate

**Duration:** 5 days

**Description:**

This course offers an excellent introduction to GSM technology, GSM network parameters, functionalities, and the parameters that influence its performance. It is designed to equip individuals who deal with GSM network aspects on a regular basis with the right knowledge and information on their networks.

**Course Objectives:**

Upon finishing this course the trainee will have:

- Understood the differences between the different types of wire line and wireless technologies.
- Known the principles of GSM technology and the main parts of a GSM network.
- Comprehended the GSM air interface and the differences between physical and logical channels.
- Understood the main functionalities of a GSM network.
- Been familiarised with main propagation phenomena at GSM.
- Known the construction of microwave network used in a GSM network.
- Understood the radio planning process in a GSM network including coverage planning, traffic dimensioning, and interference analysis.
- Known the network measurement and optimisation processes.
- Been familiarised with the different types of antennas that are used in a GSM network and the impact of each of their electrical and mechanical parameters on the whole performance of the antenna.

**Who attends this course?**

- Engineers and technicians who have a direct contact with network deployment processes.
- Team leaders.
- Radio planners.
- Network optimisation engineers and technicians.
- Project managers.
- Sub-contractors.
- Managers who manage technical staff.

**Accessories:**

All trainees will be supplied with "Wireless Domain Instruction Package" containing the complete course manual and CD for future reference to the course contents.

ما يحصل عليه المتدرب بعد انتهاء فترة التدريب:

- فهم أوجه الاختلاف والتشابه بين الأنظمة السلكية واللاسلكية المختلفة.
- التعرف على مبادئ تكنولوجيا الـ GSM ومكوناتها وطرق عملها.
- التعلم على كيفية التخطيط لشبكات الـ GSM وقياس أدائها وكذلك على نظام المايكرويف وأنظمة الهوائيات المستخدمة في شبكات الـ GSM.

الصفات التي يمكن أن تستفاد من هذا المنهج التدريبي:

- المدرء ومدراء المشاريع.
- المهندسين.
- الفنيين.
- رؤساء الفرق الفنية.
- فرق تخطيط الشبكة وقياس أدائها.
- منفذي أعمال الشبكة.

**Course Contents:**

**1. Access Methods**

FDMA/TDMA/CDMA

**2. Technology Overview**

GSM 900/1800

TETRA

GPRS

Cordless technologies

UMTS

Wireless local loop (WLL)

**3. GSM Network Parameter**

mobile station

BTS

MSC

The SIM

BSC

VLR

MS functionality

TRAU

HLR/AUC

BSS

NSS

EIR

**4. GSM Air interface**

The GSM air interface

Access schemes

The GSM modulation

Frame Hierarchy and frame number

The burst

Physical and logical channels

Types of Burst

Channels mappin

**5. Propagation in GSM**

Path loss

Multi-path fading (long term and short term fading)

Shadowing

Time dispersion and inter-symbol interference

**6. Functionalities in a GSM network**

Frequency hopping

Hopping parameters

DTX

Handover

Types of handovers

Channel coding

Speech encoder

Interleaving

The structure of the radio system

## **7. GSM Radio Planning**

- Network requirements
- Radio planning input parameters
- The planning process
- The propagation model
- Coverage
- Traffic calculation
- Frequency planning
- Traffic dimensioning
- Interference ( co-channel and adj-channel)
- Re-use patterns
- GSM network deployment

## **8. Network optimisation**

- QoS
- Performance measurements and optimisation
- Drive test
- Optimisation and measurements parameters
- Network availability and reliability
- Availability enhancements

## **9. Microwave Link**

- Definitions
- Microwave applications
- Link planning process
- A Typical Microwave system block diagrams
- Propagation in a microwave environment (atmospheric and free space)

## **10. Antennas for GSM networks**

- Types of antennas
- Single element antennas
- Multi element antennas
- Antenna parameters and how would they influence the performance of a network (Gain, input impedance, VSWR, HBW, VBW, Isolation, mechanical, environmental)
- How do you specify the antenna you need
- How do you make sure that you got what you specified
- Mechanical and electrical tilted patterns
- Remotely electrical tilted pattern
- Amplifier integrated antennas
- Real antenna examples