Table of contents

1. **Introduction** ........................................................................................................................................... 5
   1.1. About Kapsch CarrierCom AG ............................................................................................................ 5
   1.2. Our Training Philosophy ....................................................................................................................... 5
   1.3. Standard courses and customized workshops ....................................................................................... 5
   1.4. Contact .................................................................................................................................................. 6

2. **Curriculum** ............................................................................................................................................. 7

3. **Overview Courses** ................................................................................................................................. 14
   GSMR01a GSM / GSM-R Introduction ........................................................................................................ 14
   GSMR01b Customer Network Overview .................................................................................................... 15
   GSMR01 GSM / GSM-R Overview ............................................................................................................. 16

4. **BSS Courses** .......................................................................................................................................... 18
   GSMR02 GSM / GSM-R Radio Access Network ......................................................................................... 18
   BTS01 BTS 6000 / 9000 Basic Operations and Maintenance .................................................................... 19
   BTSR01 GSM BTS-R System Basic Operations and Maintenance ............................................................... 20
   BSC01 BSC / TCU 3000 Basic Operations and Maintenance .......................................................... 21
   MSS01 MSS Basic Operations and Maintenance ......................................................................................... 22
   PCU01 PCUSN Basic Operations and Maintenance ............................................................................... 23
   BSS01 BSS Advanced Operations and Maintenance .................................................................................. 24
   BSS02 OMC-R Administration – BSS OAM ............................................................................................... 25

5. **NSS Courses** ......................................................................................................................................... 27
   GSMR03 GSM / GSM-R Voice Core Network ............................................................................................ 27
   MSS01 MSS Basic Operations and Maintenance ....................................................................................... 28
   MG01 MG 15000 Advanced Operations and Maintenance .................................................................... 29
   MGWR01 MGW-R Basic Operations and Maintenance ........................................................................ 30
   MGWR02 MGW-R Advanced Operations and Maintenance ................................................................... 31
   VCN01 Voice Core Network Basic Operations and Maintenance .............................................................. 32
   SOS01 SOS Call Agent Basics .................................................................................................................. 33
   HLR01 HLR Advanced Operations and Maintenance ............................................................................... 34
   HLR02 HLR Dataserver .............................................................................................................................. 35
   MSC01 MSC-S / VLR Advanced Operations and Maintenance ................................................................. 36
   CAT01 Cisco Catalyst 4500 Basic Operations and Maintenance ............................................................. 37
6. **OAM Courses** ......................................................................................... 44
   - GSMR03 GSM / GSM-R Voice Core Network ........................................ 44
   - CBM01 CBM Basic Operations and Maintenance .................................... 45
   - CNMS01 CarrierNMS Basics ................................................................. 46
   - CNMS02 CarrierNMS FCAPS Functionality ......................................... 47
   - CNMS03 CarrierNMS Administrator .................................................... 49
   - RPM01 RPM Basics ............................................................................... 51
   - RPM02 RPM Configuration Management ........................................... 52
   - RPM03 RPM Subscriber Management ................................................ 53
   - RPM04 RPM OTA .................................................................................. 54
   - RPM05 RPM Administrator .................................................................. 55
   - RPM06 RPM Billing & Mediation ........................................................... 56
   - BMED01 Billing Mediation System Administration ............................... 57
   - BMED02 Billing Mediation Configuration ............................................ 58
   - BMED03 Billing Mediation Database ..................................................... 60
   - COAM01 COAM Basics ......................................................................... 61
   - COAM02 COAM Advanced Operations and Maintenance ................... 62

7. **GPRS Courses** ..................................................................................... 64
   - GSMR04 Introduction to GPRS .............................................................. 64
   - ASR01 ASR 5000 Basic Operations and Maintenance .......................... 65
   - FPC-R01 Flexible Packet Core Basic Operation and Maintenance ........ 66

8. **MS/EMS Courses** ............................................................................... 68
   - CAB01 Cabin Radio Operation .............................................................. 68
   - CAB02 Cabin Radio Maintenance .......................................................... 69
   - DISP01 Dispatcher System – Installation, Operation and Maintenance .... 70
   - DISP02 Dispatcher Advanced Operation ............................................... 71
1. **Introduction**

1.1. **About Kapsch CarrierCom AG**
Kapsch CarrierCom is a global system integrator and innovator of fixed, mobile, transportation and access networks solutions. The company provides an end to end service spectrum: from analysis and consulting, product design and development, installation and integration, to training, maintenance and support, as well as operations of complete networks. Kapsch CarrierCom is a global leader in the development of future technologies for service providers and has achieved world-wide market leadership in GSM-R digital wireless train communications. Among Kapsch CarrierCom's customers are some of the largest GSM-R railway operators in important markets.

1.2. **Our Training Philosophy**
Skilled and well-trained personnel are an important key item for progress and success. To meet this demand we offer a wide range of technology and product courses.

Our strength lies in the fact that the training, as well as every single trainer, is embedded in an environment of design, development, start-up and support. The trainers are involved in the development of new products and projects and can thus hand over their up-to-date know-how directly from the source to the training participants. This enables us to offer very practical courses.

To address the needs of the participants the number of participants is limited to 10 for each training module.

Our in-house labs are available for courses in which the participants can learn and practice in a "live" environment. Of course, courses can also be held at your location.

1.3. **Standard courses and customized workshops**
In addition to the standard courses described herein, we offer courses and workshops which are customized to your requirements. Customization means that we are able to adapt the length and content of any standard course, and that we are also able to offer other trainings apart from the standard courses, for instance:

- GSM-R Applications and Features
- BSS Optimization Parameters
- BSS Performance Management
- BTS Installation and Integration Workshop
- BSC Installation and Commissioning Workshop
- Release Upgrade Workshop
- NOC Workshop
1.4. **Contact**

Since we mainly do project based trainings, we do not have a schedule with open courses throughout a year. If you're interested in a course of this catalogue or in a workshop tailored to your requirements, please send an e-mail to training@kapsch.net or directly contact:

**Klaus Bernsteiner** | Training  
Phone +43 50 811 3962 | Mobile +43 664 628 3962  
E-Fax +43 50 811 983962 | klaus.bernsteiner@kapsch.net

**Kapsch CarrierCom AG** | Lehrbachgasse 11 | 1120 Vienna | Austria

**Ing. Christian Stark** | Training  
Phone +43 50 811 3317 | Mobile +43 664 628 3317  
E-Fax +43 50 811 983317 | christian.stark@kapsch.net

**Kapsch CarrierCom AG** | Lehrbachgasse 11 | 1120 Vienna | Austria

You will find further information about Kapsch CarrierCom on our homepage [www.kapschcarrier.com](http://www.kapschcarrier.com).

An overview of the entire Kapsch Group can be found online at [www.kapsch.net](http://www.kapsch.net).
2. Curriculum

Overview

GSM-R
Overview
>>> General Introduction
>>> Customer Network

GSM-R
Technology
>>> Overview
>>> Radio Access Network
>>> Voice Core Network
>>> GPRS Access and Core Technology

BSS
Basic O&M
>>> BTS
>>> BTSR
>>> BSC
>>> MSS
>>> PCU

NSS
Basic O&M
>>> MSS
>>> MGWR
>>> STP
>>> SOS
>>> CAT
>>> OME

OAM
Basic O&M
>>> CBM
>>> CNMS
>>> SCP
>>> RPM
>>> BMED
>>> COAM

GPRS
Basic O&M
>>> ASR
>>> FPC

MS/EMS
Basic O&M
>>> CAB
>>> DISP

Advanced O&M
>>> BSS
>>> OMC-R

Advanced O&M
>>> MG
>>> MGWR
>>> HLR
>>> MSC

Advanced O&M
>>> CNMS
>>> SCP
>>> RPM
>>> COAM

Legend
- Overview Course
- Technology Course
- Basic O&M Course
- Advanced O&M Course
BSS

Legend

- Overview Course
- Technology Course
- Basic O&M Course
- Advanced O&M Course

GSMR01a
GSM/GSM-R Introduction
1 day

GSMR01b
Customer Network Overview
2 days

GSMR01
GSM/GSM-R Overview
3 days

GSMR02
GSM/GSM-R Radio Access Network
2 days

BTS01
BTS 6000/9000
Basic O&M
2 days

BTSS01
BTS-R System
Basic O&M
1.5 days

BSC01
BSC/TCU 3000
Basic O&M
2 days

MSS01
MSS
Basic O&M
3 days

PCU01
PCUSN
Basic O&M
2 days

BSS01
BSS
Advanced O&M
7 days

BSS02
OMC-R
Administration
3 days
OAM

Legend
- Overview Course
- Technology Course
- Basic O&M Course
- Advanced O&M Course

GSMR01a
GSM/R Introduction
1 day

GSMR01b
Customer Network Overview
2 days

GSMR01
GSM/GSM-R Overview
3 days

GSMR03
GSM/GSM-R Voice Core Network
2 days

CBM01
CBM
Basic O&M
2 days

CNMS01
Carrier NMS
Basics
1 day

RPM01
RPM
Basics
1 day

BMED01
Bill. Med.
Sys. Adm.
2 days

COAM01
COAM
Basics
1.5 days

CNMS02
Carrier NMS
FCAPS Function
2 days

RPM02
RPM
Config Mgmt
1 day

RPM03
RPM
Subscr. Mgmt
2 days

BMED02
Bill. Med.
Config.
1.5 days

RPM04
RPM
OTA
0.5 days

RPM05
RPM
Billing & Mediation
2 days

BMED03
Bill. Med.
Database
0.5 days

CNMS03
Carrier NMS
Administrator
1 day

RPM06
RPM
Administrator
2 days

COAM02
COAM
Adv. O&M
2 days
GPRS

Legend

- Overview Course
- Technology Course
- Basic O&M Course
- Advanced O&M Course

GSMR01a
GSM/GSM-R Introduction
1 day

GSMR01b
Customer Network Overview
2 days

GSMR01
GSM/GSM-R Overview
3 days

GSMR04
GPRS Access and Core Technology
2 days

ASR01
ASR 5000
Basic Operations & Maintenance
4 days

FPC01
Flexible Packet Core
Basic Operation & Maintenance
2 days
3. **Overview Courses**

**GSMR01a  GSM / GSM-R Introduction**

**Course description**
This course provides a short introduction to mobile networks plus technical details necessary to understand GSM and GSM-R networks.

**Audience**
Nontechinal Personnel

**Objectives**
At the end of this training you will be able to:
- Understand the GSM/GSM-R System and its architecture
- Name the main GSM-R features (FA, LDA, Group Calls…)

**Prerequisites**
None

**Duration**
1 day

**Method**
- Lecture
- Demonstration

**Key Topics**
- Introduction
- GSM Network architecture of R99 and R4
- Examples of different Mobile Call Scenarios
- Overview about GSM-R Features:
  - Numbering Plan
  - Functional Addressing (FA)
  - Location Dependent Addressing (LDA)
  - Group Calls and Priority Levels
GSMR01b  Customer Network Overview

Course description  In this course you will get an overview of the delivered solution and its components.

Audience  Anyone interested

Objectives  At the end of the training you will be able to:

> Understand the basic elements and their relationships for the particular customer solution

(This training is not intended as an engineering / parameterization Overview.)

Prerequisites  None

Duration  2 days

Method  > Lecture

Key Topics  > Architecture and functionality of GSM / GSM-R Mobile Networks
> GSM-R Features
> Network architecture
  - Components
  - Topology
  - Redundancy
GSMR01  GSM / GSM-R Overview

Course description
This course provides a general introduction to mobile networks plus high-level technical details necessary for understanding GSM and GSM-R networks.

Audience
Anyone interested

Objectives
At the end of this training you will be able to:
> Describe the GSM/GSM-R System and its architecture
> List the GSM-R features (FA, LDA, ...)
> Know the main GSM-R procedures (Group Call establishment, location updating, handover, Uplink Management, eMLPP, etc.)

Prerequisites
None

Duration
3 days

Method
> Lecture
> Demonstration

Key Topics
> Introduction
> Network architecture (R99 and R4)
> Mobility Management (MM) procedures
> Connection Management (CM) procedures
> GSM-R Numbering Plan and Call Types
> GSM-R Functional Addressing (FA)
> GSM-R Location Dependent Addressing (LDA)
> VBS and VGCS, eMLPP
4. **BSS Courses**

**GSMR02  GSM / GSM-R Radio Access Network**

**Course description**
This course provides the participants with a description of GSM / GSM-R radio access networks. Also, basic technology topics of GSM based radio communications are covered.

**Audience**
Anyone interested

**Objectives**
At the end of this training you will be able to:

> Understand the GSM access technology and its physical attributes
> name details of the mobility procedures, the measurement techniques and the basic engineering aspects

**Prerequisites**
GSMR01 – GSM/GSM-R Overview

**Duration**
2 days

**Method**
> Lecture
> Demonstration

**Key Topics**
> Introduction to wireless communications
> Power level calculations
> TDMA structure of the radio link
> Physical and logical channels
> Paging
> Channel coding
> Measurements
> Handover
> Cellular principles
> Diversity
> Cell planning
BTS01  
**BTS 6000 / 9000 Basic Operations and Maintenance**

**Course description**
This course provides the participants with the basic knowledge and skills to operate and maintain BTS 6000 and BTS 9000 Base Transceiver Stations used in GSM and GSM-R networks.

**Audience**
Personnel requiring basic O&M skills

**Objectives**
After completion of this course, the attendee will have the appropriate knowledge for maintenance. You will be able to:

- Understand the architecture of the BTS 6000 and BTS 9000.
- Describe the boards and their functionality.
- Identify the boards and their front panel LED’s, and to analyze faults.
- Use the TIL to perform tests for troubleshooting.
- Identify the faulty modules and replace them.

**Prerequisites**
GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network

**Duration**
2 days

**Method**
- Lecture
- Demonstration
- Hands-on

**Key Topics**
- BTS architecture (GSM architecture, interface, frequency bands, redundancy, etc.)
- GSM components for the BTS6000 and BTS9000 (modules, functions, maintenance, etc.)
- Ancillary equipment (AC/DC power supply, CECU, cooling, battery, etc.)
- OAM interface BTS operation (LAPD Time-Slot, TEI configuration, BTS configuration, BTS software and ConfigRef, etc.)
- TIL COAM use (software, operation and function, configuration, connectivity, alarms, LEDs, etc.)
## BTSR01  GSM BTS-R System Basic Operations and Maintenance

### Course description
After completion of this course, the attendee will have the appropriate knowledge of the new BTS-R system to face maintenance required with efficiency.

### Audience
Personnel requiring basic O&M skills

### Objectives
At the end of this training you will be able to

- Understand the architecture and the system capacity of the new BTS-R.
- Describe the equipment and the modules and their functionality.
- Identify the boards and their front panel LED’s, and analyze the faults.
- Identify the faulty modules and replace them.
- Know the various network topologies supported by the BTS-R
- Identify the BTS-R software and its functions
- Use the TIL to perform commissioning and troubleshooting tests

### Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network

### Duration
1,5 days

### Method
- Lecture
- Demonstration
- Hands-on

### Key Topics
- BTS architecture (GSM architecture, interface, frequency bands, redundancy, etc.)
- GSM components for the BTS-R (Digital module (DM) Radio modules (RRHs), functions, maintenance, etc.)
- OAM interface BTS operation (LAPD Time-Slot, TEI configuration, BTS configuration, BTS software and configRef, etc.)
- BTS-R Network topologies (Star, chain, loop)
- TIL COAM use (commissioning, software, operation and function, connectivity, alarms, LEDs, etc.)
BSC01  BSC / TCU 3000 Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain BSC 3000 Base Station Controllers and TCU 3000 Transcoding Units used in GSM and GSM-R networks.

Audience
Personnel requiring basic O&M skills

Objectives
At the end of this training you will be able to:

> Describe the hardware and functional architecture of the BSC 3000 and the TCU 3000
> Describe the functions and interfaces of the boards
> Identify the equipment status via LEDs
> Troubleshoot the equipment with the TML

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network

Duration
2 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> BSC 3000 and TCU 3000 functional architecture
> BSC 3000 and TCU 3000 modules description (OMU, MMS, CEM, TMU, ATM SW, HSA-RC, TRM, etc.)
> Thermal, power and cabling aspects (power supply, cooling system, SAI, PCM cabling)
> BSC 3000 and TCU 3000 startup (startup sequence, fault management, upgrade and build, etc.)
> Trouble-shooting (TML alarms, modules replacement, LEDs)
MSS01  MSS Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain Multiservice Switch (MSS) nodes used in GSM and GSM-R networks as PCUs resp. Media Gateways.

Audience
Personnel requiring basic O&M skills

Objectives
In this seminar participants will learn how to operate the system. This includes the knowledge and the understanding of the architecture and its hardware. In addition, participants will receive an introduction to the management of the component and learn to perform basic commands.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Overview
> MSS 7000 hardware
> MSS 15000 hardware
> Software architecture
> Component model and CLI command syntax
> Description of basic components (Time, Ns, Nmis, Ac, Col, Fs, Prov)
> Logical Processor (Lp) and Software (Sw) component
> Alarms and State Change Notifications (SCNs)
> How to perform hardware tests
PCU01  PCUSN Basic Operations and Maintenance

Course description  This course provides the participants with the basic knowledge of the PCUSN (Packet Control Unit Support Node).

Audience  Personnel requiring basic O&M skills

Objectives  At the completion of this course, you will be able to:

> Describe the hardware and functional architecture of the PCUSN
> Understand the functions of the boards and associated interfaces
> Identify the software structure of the PCUSN
> Inspect the basic configuration
> Know the basic dimensioning rules

Prerequisites  GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network
MSS01 – MSS Basic Operation and Maintenance

Duration  2 days

Method  > Lecture
> Demonstration
> Hands-on

Key Topics  > PCUSN in the GSM-R network
> PCUSN physical characteristics
> PCUSN module description
> Software distribution on hardware units
> Dimensioning and configuration rules
# BSS01 BSS Advanced Operations and Maintenance

## Course description
This course covers the BSS OAM principles and describes the procedures related to the BSS Operation and Maintenance tasks. It is based on the exhaustive use of the OMC-R. The course includes both a theoretical part and a practical part. Emphasis has been put on many hands-on exercises.

## Audience
Personnel responsible for configuration management and advanced O&M

## Objectives
In this course the participants will learn how to configure a small GSM / GSM-R sample radio network. You will be able to:

- Understand the OMC-R Architecture and GUI Navigation.
- Configure and reconfigure the Base Station Subsystem (BSS) network, including the BSC, BTS and TCU network, and be able to modify their parameters,
- Describe the upgrade process of the BSS software version, backup and restore of the database,
- Understand the remote maintenance of the BSS (understand alarms and notifications, then accurately identify and locate the fault).
- Understand common operations performed on a daily base

## Prerequisites
- GSMR01 – GSM/GSM-R Overview
- GSMR02 – GSM/GSM-R Radio Access Network
- BTS01 – BTS 6000/9000 Basic Operation and Maintenance or
- BSC01 – BSC/TCU 3000 Basic Operation and Maintenance or
- MSS01 – MSS Basic Operation and Maintenance plus
- PCU01 – PCUSN Basic Operation and Maintenance

## Duration
7 days

## Method
- Lecture
- Demonstration
- Hands-on

## Key Topics
- GSM/GSM-R Access functional architecture (system architecture, BTS, BSC, TCU, and PCU functionality)
- OMC-R hardware and system description (servers, SGD server, clients, interfaces, documentation)
- Introduction to the OMC-R GUI (Graphical User Interface)
- Creating GSM/GSM-R/GPRS access configuration
- Configuration management (provisioning of various objects, e.g. for BSC, TCU, PCU, cells, channels links, mobility, LAPD, etc.)
- Software management
- Fault management and operations
BSS02  OMC-R Administration – BSS OAM

Course description
This course covers the BSS OAM principles and describes the procedures related to the administration of BSS Operation and Maintenance (operate, maintain and reconfigure) based on Oracle Server.

Audience
Personnel responsible for configuration management and advanced O&M

Objectives
At the end of this training you will be able to:
> Understand the OMC-R Architecture and GUI Navigation,
> Describe the OMC-R server hardware,
> Know the GSM Access Fault Management and the Operations,
> Describe the upgrade process of the BSS software version, backup and restore of the database,
> Understand the remote maintenance of the BSS (understand alarms and notifications, then accurately identify and locate the fault),
> Understand common maintenance performed on a daily base,
> Know the main Network Reconfiguration Procedures and the OMC-R Operating Control Procedure.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR02 – GSM/GSM-R Radio Access Network
BTS01 – BTS 6000/9000 Basic Operation and Maintenance or
BSC01 – BSC/TCU 3000 Basic Operation and Maintenance or
MSS01 – MSS Basic Operation and Maintenance plus
PCU01 – PCUSN Basic Operation and Maintenance

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> OMC-R Hardware Description (Sun Fire T5140 and Disk Array ST2510 description: IP connection, ILOM ,ISCSI links …)
> Graphical User Interface (GUI) Overview (Display mode overview, Objects Menu, Security Management and Administration Menu)
> Fault Management and Operations (Fault and alarms management, notifications and Logs …)
> Network Reconfiguration Procedures (Startup, shutting down, check, restoration and backup on DVD …)
Intentionally blank
5. NSS Courses

GSMR03 GSM / GSM-R Voice Core Network

Course description
This course provides the participants with a description of how a GSM / GSM-R voice core network evolves from R99 to the R4 network architecture. A summary of the essential SS7 functionalities is given and extends towards the implementation of SIGTRAN (SS7 over IP) and Megaco/H.248 (the interface used by the MSC server to control the MGW) on protocol level.

Audience
Anyone interested

Objectives
In this seminar, participants will learn about the architecture of a voice R4 core network and the associated hardware.

Prerequisites
GSMR01 – GSM/GSM-R Overview

Duration
2 days

Method
> Lecture
> Demonstration

Key Topics
> Network architecture (R99 and R4)
> Handover procedures where the core network is involved
> Introduction to SS7
> R4 interfaces and protocols
> H.248 (Mc interface)
> Stream Control Transmission Protocol (SCTP)
> MTP3 User Adaption (M3UA)
MSS01  MSS Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain Multiservice Switch (MSS) nodes used in GSM and GSM-R networks as PCUs resp. Media Gateways.

Audience
Personnel requiring basic O&M skills

Objectives
In this seminar participants will learn how to operate the system. This includes the knowledge and the understanding of the architecture and its hardware. In addition, participants will receive an introduction to the management of the component and learn to perform basic commands.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Overview
> MSS 7000 hardware
> MSS 15000 hardware
> Software architecture
> Component model and CLI command syntax
> Description of basic components (Time, Ns, Nmis, Ac, Col, Fs, Prov)
> Logical Processor (Lp) and Software (Sw) component
> Alarms and State Change Notifications (SCNs)
> How to perform hardware tests
MG01 MG 15000 Advanced Operations and Maintenance

**Course description**
In this course the participants will learn how to configure a Media Gateway 15000. Also, advanced operations and maintenance topics will be covered.

**Audience**
Personnel responsible for configuration management and advanced O&M

**Objectives**
In this seminar, participants will learn about the interfaces used on the particular cards and the related software components as well as to know and configure their parameters. Another focus is to monitor Alarms, logs, statistics and troubleshooting.

**Prerequisites**
- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network
- MSS01 – MSS Basic Operation and Maintenance

**Duration**
2 days

**Method**
- Lecture
- Demonstration
- Hands-on

**Key Topics**
- MG 15000 hardware
- Software architecture
- IP addressing, routing and forwarding
- VSP4 resource management
- Voice features
- MTP3
- M3UA and SCTP
- VBS and VCGS
MGWR01  MGW-R Basic Operations and Maintenance

Course description  This course provides the participants with the basic knowledge and skills to operate and maintain the Next Generation Media Gateway for GSM Railway Network (MGW-R)

Audience  Personnel requiring basic O&M skills

Objectives  In this seminar, participants will learn how to operate the system. This includes the knowledge and the understanding of the architecture and its hardware. In addition, participants will receive an introduction to the management of the component and learn to perform basic commands.

Prerequisites  GSMR01 – GSM/GSM-R Overview
                GSMR03 – GSM/GSM-R Voice Core Network

Duration  3 days

Method  > Lecture
        > Demonstration
        > Hands-on

Key Topics  > Describe the hardware and functional architecture of the MGW-R
            > Describe the main MGW-R Interfaces (A, ISDN, Nc, Mc, Nb, H.248, SS7 ...)
            > Introduction to MGW-R management via MetaViewer Explorer (MVE) and Craft terminal.
**MGWR02 MGW-R Advanced Operations and Maintenance**

**Course description**
In this course the participants will learn how to configure the Next Generation Media Gateway for GSM Railway Network (MGW-R). Also, advanced operations and maintenance topics will be covered.

**Audience**
Personnel responsible for management and advanced O&M.

**Objectives**
In this seminar, participants will learn about the interfaces used on the particular cards and the related software components as well as to know and configure their parameters. Another focus is to monitor Alarms, logs, statistics and troubleshooting.

**Prerequisites**
- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network
- MGWR01 – MGW-R Basic Operation and Maintenance

**Duration**
2 days

**Method**
- Lecture
- Demonstration
- Hands-on

**Key Topics**
- MGW-R in GSM Railway network
- Main interfaces of Media Gateway for Railway (ISDN, Nc, Mc, Nb, H.248, SS7 ...)
- Management, configuration and commissioning of MGW-R interfaces via MetaViewer Explorer
- Alarms and Logs, Statistics,
- Users, Craft terminal
- Geo-redundancy
- Troubleshooting
VCN01 Voice Core Network Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain Advanced Telecommunications Computing Architecture (ATCA) nodes used in GSM / GSM-R networks as MSC Server, VLR and HLR.

Audience
Personnel requiring basic O&M skills

Objectives
In this seminar, participants will learn how to operate the system. This includes the understanding of the architecture of the system, the handling of the hardware, executing simple commands as well as fault isolation and their solutions.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> R4 network architecture
> ATCA standard and HW platform
> Hardware overview
> Card description
> Configuration examples for MSC-S and HLR applications
> Basic maintenance tasks using Command Line Interface (CLI)
> Command subsystems
> Fault management
**SOS01  SOS Call Agent Basics**

**Course description**
In this course the participants will learn the basic operation of the SOS Call Agent command syntax. This knowhow is necessary to understand the operating principles of call agents inside the MSC-S & HLR platforms.

**Audience**
Personnel responsible for configuration management and advanced O&M

**Objectives**
In this seminar, participants will learn to understand and how to operate the SOS call agent.

**Prerequisites**
- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network
- VCN01 – Intro to SOS

**Duration**
2 days

**Method**
- Lecture
- Demonstration
- Hands-on

**Key Topics**
- Login procedures
- CI Commands
- Symbol table
- Subsystems
- Table Editor
- Maintenance Levels
- File System Tools
- Logutil
HLR01  HLR Advanced Operations and Maintenance

**Course description**
In this course the participants will learn how to configure a HLR (Home Location Register). Also, advanced operations and maintenance topics will be covered.

**Audience**
Personnel responsible for configuration management and advanced O&M

**Objectives**
Participants will learn in this seminar the basics of the HLR table structure. This includes the understanding of the data structure and subscriber profiles. The practical exercises include, among other things, datafill examples and reading out the relevant data.

**Prerequisites**
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
VCN01 – Voice Core Network Basic Operation and Maintenance
SOS01 – Intro to SOS

**Duration**
2.5 days

**Method**
- Lecture
- Demonstration
- Hands-on

**Key Topics**
- Provisioning architecture overview
- Data fill subscriber data in GHLRxxy tables
- Provisioning and registering supplementary services
- Data server
HLR02  HLR Dataserver

Course description  This course provides the participants with an overview about the HLR Dataserver (HLR-DS). Topics covered are the main processes, subscriber data fill sequence and the SQLPLUS interface.

Audience  Personnel requiring basic O&M skills

Objectives  Participants in this seminar will obtain an overview of the most important processes, the subscriber datafill sequence and the SQLPLUS interface of the HLR Data Server.

Prerequisites  GSMR01 – GSM/GSM-R Overview
               GSMR03 – GSM/GSM-R Voice Core Network
               VCN01 – Voice Core Network Basic Operation and Maintenance
               SOS01 – Intro to SOS
               HLR01 – HLR Advanced Operation and Maintenance

Duration  0.5 days

Method  
> Lecture
> Demonstration
> Hands-on

Key Topics  
> HLR-DS overview
> Hardware
> Data fill sequence for subscriber profiles
> Control of main processes
> SQLPlus interface
> Backup & restore
MSC01  MSC-S / VLR Advanced Operations and Maintenance

Course description
In this course the participants will learn how to configure a MSC-Server including VLR functionality. Also, advanced operations and maintenance topics will be covered.

Audience
Personnel responsible for configuration management and advanced O&M

Objectives
In this seminar, participants will learn about the details how to datafill the MSCs / VLRs. This includes the knowledge and understanding of the table structure and the routing process. The participants should be able to independently enter new data, such as number ranges.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
VCN01 – Voice Core Network Basic Operation and Maintenance
SOS01 – Intro to SOS

Duration
7 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Basic concepts of translations
> Data fill of trunk group tables
> Data fill of universal translations tables supporting all types of mobile calls
> Data fill of translations tables to send specified calls to treatment
> Data fill of VLR translations tables for call barring
> Data fill of translations tables to route a call based on specific characteristics
> Data fill of inter-MSC handover
> Check translation data fill using TRAVER
> Global Title Translation
> VLR and Pre-VLR translation
CAT01  Cisco Catalyst 4500 Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain Cisco Catalyst 4500 series switches used in R4 based GSM/GSM-R networks.

Audience
Personnel requiring basic Operation and Maintenance skills

Objectives
At the end of this training the participant will be able to:

> Understand and describe the 4500 Cisco devices architecture.
> Configure a router and a switch for basic functionality
> Understand and describe basic networking switching and routing concepts.
> Understand and describe how VLANs create logically separated networks and how routing can be established between them.
> Understand and describe dynamic routing protocols, the course focuses on OSPF and partially of MP-BGP
> Understand and describe the VRF lite concept.
> Understanding and using Cisco IOS and its command line interface.
> Configure and troubleshoot different types of Cisco 4500 interfaces.
> Configure and troubleshoot the Spanning Tree protocol
> Configure and troubleshoot an Open Shortest Path First (OSPF) network
> Configure and troubleshoot static routing and the Hot Standby Redundancy Protocol
> Understand, configure, and troubleshoot access control lists (ACLs) for IPv4

Prerequisites
> GSMR01 – GSM/GSM-R Overview
> GSMR03 – GSM/GSM-R Voice Core Network
> Knowledge of Ethernet and IP
> Access to a local Catalyst 4500 switch

Duration
4 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Hardware architecture
> Software and file system
> Command Line Interface (CLI)
> Software management
  – Versions, download, upgrade
> Configuration management
  – How to save, load, backup and delete configuration files
> Selected configuration tasks
  – Interfaces management
  – Layer 2
    ▪ VLAN management
    ▪ Spanning tree
    ▪ Security features
    ▪ Loop prevention
  – Layer 3
    ▪ OSPF
    ▪ Static
  – Redundancy
    ▪ HSRP (VRRP)
  – VRF lite
    ▪ VRF basics
    ▪ Inter VRF leaking (BGP basics included)
  – Basic Multicast – IGMP snooping
  – QoS
> Monitoring and trouble-shooting
SCP01  GSM-R SCP Basics and Services

Course description
In this course the participants will learn how to use the SCP Service Control Point (SCP) platform for the configuration of GSM-R IN services.

Audience
Personnel responsible for the configuration of SCP services

Objectives
At the end of this training you will be able to explain how the SCP platform performs in a GSM-R network. You will get an overview about the operation, the administration, the maintenance and the provisioning of the GSM-R SCP platform.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network

Duration
4 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> SCP basics
  – Introduction to IN and GSM-R
  – Basic GSM-R IN services (Follow Me and LDA)
  – SCP hardware, software and documentation
  – Linux operating system basics
  – SCP GUI
> SCP services
  – Data management (tools and interfaces)
  – Service features
  – Service configuration data and TCR
  – Provisioning exercise
SCP02  GSM-R SCP Advanced Operations and Maintenance

Course description
In this course the participants will learn how to operate and maintain the SCP platform. Also, supplementary modules and skills will be covered.

Audience
Personnel responsible for advanced O&M

Objectives
At the end of this training you will be able to operate the GSM-R SCP platform. You are familiar with the administration, the maintenance and the provisioning of the SCP platform.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
SCP01 – SCP Basics and Services

Duration
4 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> SCP operations and maintenance
  - OAM GUI
  - Operations (log system, audits etc.)
  - File system
  - Preventative maintenance
  - Domain Manager (DM)
  - Service Order Processing (SOP) and DM synchronization
  - Trouble-shooting
  - User IDs and passwords

> Supplementary modules and skills
  - Patching
  - Protocol Translation Unit
  - SIGTRAN configuration and trouble-shooting
STP01    SG/STP Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain the Signaling Gateway and the Signaling Transfer Point used in GSM and GSM-R networks.

Audience
Personnel requiring basic O&M skills

Objectives
In this course, participants will learn about the basic functions of the operation and maintenance of the Signaling Gateway, as it is used in the GSM and GSM-R networks.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Signaling Gateway (SG) and Signaling Transfer Point (STP) in signaling networks
> Hardware components
> Software functionality
> Introduction to the GUI and basic operation
> Overview configuration
> Overview logs and system alarms
OME01  OME6xxx Basic Operations and Maintenance

Course description
This course provides the basic knowledge and skills to operate and maintain transmission networks based on Ciena OME6xxx series network elements.

Audience
Personnel requiring basic O&M skills

Objectives
At the end of this training participants will adopt conceptual knowledge of TDM networks and will be able to perform basic operation and maintenance activities on the Ciena OME6xxx series equipment.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network

Duration
3 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Introduction to TDM - Time Division Multiplexing and optical networking
> OME6xxx product line overview
> OME6xxx Web User Interface
> Incident management
> Hands on - Labs
Intentionally blank
6. **OAM Courses**

**GSMR03  GSM / GSM-R Voice Core Network**

**Course description**
This course provides the participants with a description of how a GSM / GSM-R voice core network evolves from R99 to the R4 network architecture. A summary of the essential SS7 functionalities is given and extends towards the implementation of SIGTRAN (SS7 over IP) and Megaco/H.248 (the interface used by the MSC server to control the MGW) on protocol level.

**Audience**
Anyone interested

**Objectives**
In this seminar, participants will learn about the architecture of a voice R4 core network and the associated hardware.

**Prerequisites**
GSMR01 – GSM/GSM-R Overview

**Duration**
2 days

**Method**
- Lecture
- Demonstration

**Key Topics**
- Network architecture (R99 and R4)
- Handover procedures where the core network is involved
- Introduction to SS7
- R4 interfaces and protocols
- H.248 (Mc interface)
- Stream Control Transmission Protocol (SCTP)
- MTP3 User Adaption (M3UA)
### CBM01 CBM Basic Operations and Maintenance

**Course description**

This course provides the participants with the basic knowledge and skills to operate and maintain Core and Billing Manager (CBM) systems used in GSM and GSM-R networks.

**Audience**

Personnel requiring basic O&M skills

**Objectives**

In this seminar the participants will learn how to operate the CBM system. This includes knowledge about the architecture of the system and its interfaces to other systems, as well as performing basic maintenance tasks.

**Prerequisites**

- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network

**Duration**

2 days

**Method**

- Lecture
- Demonstration
- Hands-on

**Key Topics**

- CBM overview & evolution
- Documentation
- Hardware
- Software
- User interfaces
- CBM maintenance
- CallAgent maintenance
- Applications
- Fault management
- Supernode Billing Application (SBA)
CNMS01  CarrierNMS Basics

Course description  This course provides the participants with a general introduction to the CarrierNMS system.

Audience  Personnel requiring basic O&M skills

Objectives  At the end of this training you will be able to understand the concepts of the CarrierNMS network management and its event processing. You will be able to handle the management GUI, to monitor alarms, events and notifications. You will be able to do basic configuration tasks of the network elements, which are managed by the CarrierNMS.

Prerequisites  GSMR01 – GSM/GSM-R Overview
              GSMR03 – GSM/GSM-R Voice Core Network

Duration  1 day

Method  > Lecture
        > Demonstration

Key Topics  > Introduction, prerequisites, purpose of a CarrierNMS system
            > CarrierNMS architecture & platform
              - Configuration variants, hardware and software
            > CarrierNMS network management concepts
              - FCAPS and TMN layers
              - Definitions
              - Schematic event processing overview
            > CarrierNMS user interface
              - GUI
              - Dashboard and Home Screen
              - A walk through the application screens
            > Fault management
              - Alarm vs. Event
              - Alarm display
              - Filtering of alarms
              - Alarm administration
              - Alarm forwarding
              - Notifications
              - Outages
            > Log Browser
              - Log display
              - Filtering of log records
              - Log forwarding
            > Centralized configuration management by access to network elements
CNMS02  CarrierNMS FCAPS Functionality

Course description  This course shows the participants how to use the CarrierNMS system while performing FCAPS related tasks.

Audience  Personnel requiring O&M skills

Objectives  At the end of this training you will be able to apply patches to the CarrierNMS system and to backup and restore the configuration. You will be able to configure and handle the fault management, do automatic and manual configuration of network elements, as well as to configure the performance management, users, groups and roles.

Prerequisites  GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
CNMS01 – Carrier NMS Basics
Basic Linux/Unix skills are recommended

Duration  2 days

Method  >  Lecture
>  Demonstration
>  Hands-on

Key Topics  >  Application administration
–  Automatic discovery
–  Node administration
–  Asset information
–  Surveillance categories
>  Fault management incl. rules & filters - Alarm thresholds
>  Performance management
–  Analysis of historic performance counters
–  Analysis of real-time performance data
–  definition of KPI's
–  Standard reporting and customized reports
>  Configuration management
–  SW/Patch-Management
–  Configuration of backup & restore
–  Inventory data collection
>  Security
–  Security model supporting LDAP
–  Configuration of users, groups and roles
–  single sign on
>  Network topology map
>  Correlation engine
> Optional integration with network elements, enterprise systems (e.g. inventory system, trouble ticketing system,...) or northbound systems (e.g. Umbrella System)

> Optional evolution steps of CarrierNMS
CNMS03  CarrierNMS Administrator

Course description
In this course the participants learn how to administrate the CarrierNMS system.

Audience
Administrators

Objectives
At the end of this training you will be able to identify the various SW components and the databases which are used in the CarrierNMS system and their cooperation. You will have a detailed understanding about the used HW and will be able to replace defective parts. You are able to perform various SW related tasks, like patching and upgrading the system software, do backup and restore operations, handle and troubleshoot system faults.

Prerequisites
- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network
- CNMS01 – Carrier NMS Basics
- CNMS02 – Carrier NMS FCAPS Functionality
Basic Linux/Unix skills are recommended

Duration
1 day

Method
- Lecture
- Demonstration
- Hands-on

Key Topics
- Setup
  - Server racking & cabling
  - Server components & setup
  - Disk mirroring
  - Customer specific hardware set-up (standalone vs. geo-redundancy setup)
- Overview 3rd party software
  - OS
  - Cluster software
  - ILOM
  - OS Agent
- Maintenance
  - System backup/restore (incl. disaster recovery)
  - Database backup/restore
  - File maintenance
  - Patch/Release upgrade
  - Monitor network replication (/data/pqsql & /data/opennms)
- Configuration
  - active/standby configuration & switchover procedure
  - Introduction to CarrierNMS database
  - Configuration methods of CarrierNMS/parameterization
  - Basic management of CarrierNMS platform
- Security
- Security logs
- Security management of CarrierNMS (active directory authentication, administration of user, roles and rights)

> Fault Handling
- Verification of databases and services
- Schematic trouble-shooting procedures
- Network interfaces and Linux Bonding
RPM01        RPM Basics

Course description        This course provides the participants with an overview of the RPM (Railway Provisioning Manager).
Audience         Anyone interested
Objectives        In this seminar, the participants will get an overview of the RPM components and their interfaces and learn how to use the RPM "User Interface".
Prerequisites
  GSMR01 – GSM/GSM-R Overview
  GSMR03 – GSM/GSM-R Voice Core Network
Duration        1 day
Method         > Lecture
  > Demonstration
  > Hands-on

Key Topics
  > RPM architecture
  > Modules and their functionality
  > RPM user interface
  > Number directory
  > Scheduling mechanism
RPM02  
**RPM Configuration Management**

**Course description**  
In this course the participants will learn how to use the RPM (Railway Provisioning Manager) to configure basic GSM-R features.

**Audience**  
Personnel responsible for configuration management

**Objectives**  
In this seminar, the participants learn how to configure sites, cells, tracks, LDA, GCA and GCR via the Railway Provisioning Manager (RPM).

**Prerequisites**  
GSMR01 – GSM/GSM-R Overview  
GSMR03 – GSM/GSM-R Voice Core Network  
RPM01 – RPM Basics

**Duration**  
1 day

**Method**  
- Lecture  
- Demonstration  
- Hands-on

**Key Topics**  
- Configuration of sites, cells and tracks  
- Configuration of the Location Dependent Addressing (LDA)  
- Configuration of the Group Call Areas  
- Configuration of the Group Call Register
RPM03  
RPM Subscriber Management

Course description
In this course the participants will learn how to use the RPM (Railway Provisioning Manager) to configure GSM-R subscribers and their profiles.

Audience
Personnel responsible for configuration management

Objectives
After this seminar, the participants will be able to manage the configuration of subscribers, their SIM cards, they will apply the MSISDN and the "administrative profiles" with the Railway Provisioning Manager (RPM).

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
RPM01 – RPM Basics

Duration
2 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> MSISDN management
> Profile management
> Subscriber lifecycle management (activation, deactivation, SIM replacement etc.)
> SIM management
> SIM files that are configured by RPM
RPM04 RPM OTA

Course description
In this course the participants will learn how to use the OTA (Over The Air) functionality of RPM (Railway Provisioning Manager).

Audience
Personnel responsible for configuration management

Objectives
In this seminar the participants will learn how to operate and configure the RPM OTA system. This includes getting to know the architecture of the system.

Prerequisites
- GSMR01 – GSM/GSM-R Overview
- GSMR03 – GSM/GSM-R Voice Core Network
- RPM01 – RPM Basics
- RPM02 – RPM Config Management or
- RPM03 – RPM Subscriber Management

Duration
0.5 days

Method
- Lecture
- Demonstration
- Hands-on

Key Topics
- RPM setup for OTA
- SIM card parameters for OTA
- Differences between SIM writer configuration and OTA configuration
RPM05  RPM Administrator

Course description
In this course the participants will learn how to administrate the RPM (Railway Provisioning Manager).

Audience
Personnel responsible for the administration of the RPM

Objectives
At the end of this training you will be able to configure, to manage and to administrate the RPM.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
RPM01 – RPM Basics
RPM02 – RPM Config Management or
RPM03 – RPM Subscriber Management
Basic Linux/Unix skills are recommended

Duration
2 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
> Management of RPM users and their roles
> Configuration of RPM parameters
> Management of the RPM database
> Backup of RPM data and the RPM database
> Management of an RPM cluster (optional)
RPM06  RPM Billing & Mediation

Course description
In this course the participants will learn how to use RPM Billing processes, understand how to configure the base model through Customer, Accounts, Contracts and Partner definition. They will learn also how to analyse and export the Billing data. They will learn how to use RPM Billing Mediation processes, understand the different data sources and how to work with the many available reports as well.

Audience
Personnel responsible for management of Billing and for the analyzing of Billing Mediation data through RPM.

Objectives
At the end of this training you will be able to manage and configure all Billing relevant data, and to view and analyze the Billing output data. You will be able to manage and control the different data sources and to view, analyze and schedule the different RPM Billing Mediation Reports as well.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
RPM01 – RPM Basics
RPM03 – RPM Subscriber Management

Duration
2 days

Method
> Lecture
> Demonstration
> Hands-on

Key Topics
Billing topics
> Understand the Billing process and the different entities involved in Retail and Wholesale Billing
> Manage and configure Rateplans
> Configure base data for Customers, Accounts, Contracts, Partners and Trunks
> Understand and configure Additional charges
> View and analyze the output Billing reports

Billing Mediation topics
> Understand the different data sources
> Manage the reporting functionalities including scheduling
> Monitor and correct input data
> Understand and analyze the MSC usage based reports
> Understand and analyze other reports
BMED01    Billing Mediation System Administration

Course description  In this course you will learn about the components of the Billing Mediation System and its fundamental administration tasks.

Audience  Billing Mediation System Administrators
          Billing Mediation System Operators

Objectives  At the end of this training you will be able to:
> Understand the different product components
> Perform the main administration tasks
> Backup and Restore

Prerequisites  GSMR01 – GSM/GSM-R Overview
                GSMR03 – GSM/GSM-R Voice Core Network

Duration  2 days

Method  > Lecture
        > Demonstration
        > Hands-on

Key Topics  > Product Overview and Introduction
            > System Environment
            > MediationZone Platform
              - Installation and Maintenance
            > Access Zone
              - Create new Desktop instances
              - System Export and Import
            > Execution Context
              - Installation and optimization
              - Upgrade and Maintenance
            > Security
            > High Availability
BMED02  Billing Mediation Configuration

Course description  In this course you will get familiar with the different components of the Billing Mediation system, its administration and the configuration of the system.

Audience  Billing Mediation System Administrators
Billing Mediation System Operators

Objectives  At the end of this training you will be able to:
> Identify the different components of the solution
> Monitor and Reprocess Error Batches
> Administrate and configure the system

Prerequisites  GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
BMED01 – Billing Mediation System Administration

Duration  1,5 days

Method  > Lecture
> Demonstration
> Hands-on

Key Topics  > Implementation, Presentation, Introduction
  − Workflow Overview, ECS Workflow, Alarming, Database output
> Workflow configuration
  − Input Agents
  − Duplication Detection Agents
  − Output Agents
> ECS System
  − Reprocessing groups
  − Error conditions
  − Reprocessing a file/batch
  − Rollback functionality
> Alarming and notification
  − Email Configuration, SNMP Notification, configuring new alarms
> System Operation
  − Import & Export
  − Workflow and Log monitoring
  − Backup
− Cleaning Tasks
> CBM Configuration and Activation
BMED03 Billing Mediation Database

Course description
In this course you will learn about the relevant database structures and about the necessary database parameters.

Audience
Billing Mediation System Administrators
Billing Mediation System Operators

Objectives
At the end of this training you will be able to:
- Configure the necessary database parameters
- Identify the main table structures
- Query and identify the table content

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR03 – GSM/GSM-R Voice Core Network
BMED01 – Billing Mediation System Administration
BMED02 – Billing Mediation Configuration

Duration
0.5 days

Method
- Lecture
- Demonstration
- Hands-on

Key Topics
- Database process overview
  - Loading
  - Scheduling and configuration
- Database Structure
  - CDR tables
  - Module tables
- Query optimization
## COAM01  COAM Basics

**Course description**  
This course provides the participants with a generic introduction to the Converged OAM solution.

**Audience**  
Personnel requiring basic O&M skills

**Objectives**  
At the end of this training you will be familiar with:

- The principles and the architecture of the Converged OAM platform
- The basic Converged OAM Management
- The Virtual Machine availability, the hardware redundancy, the Disaster Recovery, etc.

**Prerequisites**  
GSMR01 – GSM/GSM-R Overview  
GSMR03 – GSM/GSM-R Voice Core Network

**Duration**  
1.5 days

**Method**  
- Lecture
- Demonstration
- Hands-on

**Key Topics**  
- Principles of Converged OAM
- Benefits of Converged OAM
- Software Platform: Hypervisors, Virtual Machines, ...
- Hardware Platform
- Introduction of the Virtualization tasks
- Disaster Recovery (application, virtual machine, etc…)
COAM02    COAM Advanced Operations and Maintenance

Course description    This course provides the participants with an in depth look into the Converged OAM administration and troubleshooting.

Audience    Personnel requiring advanced administrator skills

Objectives    At the end of this training you will be able to understand:

> the fundamental aspects of the Converged OAM software architecture (Linux, Redhat Virtualization (RHEV, ipa))
> the advanced administration tasks: VMs creation (parameter set up, ...) , Reports, Dashboard
> the integration of the COAM system into IT environments (DNS, LDAP, ...)

Prerequisites    GSMR01 – GSM/GSM-R Overview
                 GSMR03 – GSM/GSM-R Voice Core Network
                 COAM01 – Converged OAM Basics
                 Basic Linux/Unix skills are recommended

Duration    2 days

Method    > Lecture
> Demonstration
> Hands-on

Key Topics    > Converged OAM software architecture
              – Redhat Linux and Virtualization
              – Administration
              – Integration
# 7. GPRS Courses

## GSMR04 Introduction to GPRS

<table>
<thead>
<tr>
<th>Course description</th>
<th>This course provides the participants with a description of GPRS (General Packet Radio Service).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Anyone interested</td>
</tr>
<tr>
<td>Objectives</td>
<td>In this seminar, the participants will learn how the GPRS system fits in both the radio access and the core network. The solution and the associated network components will be presented.</td>
</tr>
</tbody>
</table>
| Prerequisites      | GSMR01 – GSM/GSM-R Overview  
GSMR02 – GSM/GSM-R Radio Access Network is strongly recommended |
| Duration           | 2 days                                                                                         |
| Method             | > Lecture  
> Demonstration                                                                                   |

### Key Topics

> Overview about Network Architecture and Protocols  
> GPRS service parameters  
> Physical and logical channels  
> Channel coding  
> RR and RLC/MAC packets and procedures  
> MM/GMM packets and procedures  
> CM/SM packets and procedures
ASR01  ASR 5000 Basic Operations and Maintenance

Course description
This course provides the participants with the basic knowledge and skills to operate and maintain Aggregation Services Router (ASR) 5000 nodes used in GSM / GSM-R networks as SGSNs and GGSNs.

Audience
Personnel requiring basic O&M skills

Objectives
In this seminar, participants will learn how to operate the system. This includes the understanding of the architecture of the system, the handling of the hardware, how to perform basic commands, as well as to perform fault isolation and troubleshooting.

Prerequisites
GSMR01 – GSM/GSM-R Overview
GSMR04 – GPRS Access and Core Technology

Duration
4 days

Method
> Lecture
> Demonstration
> Hands-on

Key topics
> Introduction
> Hardware architecture
> Software architecture
> Command Line Interface (CLI)
> File system
> Configuration management
> Software and license key management
> Monitoring and trouble-shooting
> SGSN / GGSN example configuration
> Introduction to the Web Element Manager (WEM)
> Labs
### FPC01 Flexible Packet Core Basic Operation and Maintenance

<table>
<thead>
<tr>
<th>Course description</th>
<th>This course provides the participants with the basic knowledge and skills to operate and maintain the Flexible Packet Core nodes used in GSM / GSM-R networks as SGSNs and GGSNs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Personnel requiring basic O&amp;M skills</td>
</tr>
<tr>
<td>Objectives</td>
<td>In this seminar, participants will learn how to operate the system. This includes the understanding of the architecture of the system, the handling of the hardware, how to perform basic commands, as well as to perform fault isolation and troubleshooting.</td>
</tr>
</tbody>
</table>
| Prerequisites      | GSMR01 – GSM/GSM-R Overview  
GSMR04 – GPRS Access and Core Technology |
| Duration           | 2 days |
| Method             | Lecture  
Demonstration  
Hands-on |

| Key topics |  
GPRS Overview  
Hardware architecture  
Network Overview  
Redundancy Mechanism  
Command Line Interface (CLI) Operation  
HP integrated Lights out (iLO)  
RHQ introduction  
GUI Operation  
GUI Configuration  
Gathering Trace Information |
Intentionally blank
8. **MS/EMS Courses**

**CAB01  Cabin Radio Operation**

**Course description**
In this course the participants will learn how to install, configure and operate the offered Cab Radio solution. Administration and maintenance is to some extent covered in this training as well.

**Audience**
Maintenance Staff, Operations

**Objectives**
At the end of this training you will be able to proper operate and use all functionalities of the Cabradio RC900 product.

**Prerequisites**
GSMR01 – GSM/GSM-R Overview

**Duration**
2 days

**Method**
> Lecture
> Demonstration
> Hands on

**Key Topics**

> Module I
  - RC900 Introduction
  - GSM-R Fundamentals
  - RC900 Knowledge
  - RC900 Power On

> Module II
  - Call scenarios: Point to Point calls, Group calls, Emergency calls (REC)

> Module III
  - Menu: Description and Access

> Module IV
  - Advanced Configuration: Access, Details

> Module V - Hands on
  - Driver Machine Interface
  - RC900 Power on
  - Engine/Train number Login
  - RC900 Power off
  - Various call scenarios: Point to Point call, Group call, Emergency call, Multiple driver call
  - Text message (SMS)
  - Advanced Config Access
  - Advanced Config details
CAB02 Cabin Radio Maintenance

Course description
In this course the participants will learn how to configure and operate the offered Cab Radio solution. Administration and maintenance is the main part of this training.

Audience
Maintenance Staff, Operations

Objectives
At the end of this training you will be able to understand the architecture and all components of the Cabradio RC900 in order to deliver proper maintenance service.

Prerequisites
GSMR01 – GSM/GSM-R Overview
CAB01 – Cab Radio Operation

Duration
3 days

Method
> Lecture
> Demonstration
> Hands on

Key Topics
> Module I
  - Introduction
  - Rack RC900
  - DMI900
  - Configurations
  - Components
  - Technical specifications
  - Module description
  - Radio Parameters
  - Functional Specification
  - DMI900 description
  - RC900 Block diagram
  - Technical annexes

> Module II
  - Maintenance procedure
  - Preventive Maintenance
  - Corrective Maintenance
  - Spare list
  - Hands on exercises
DISP01 Dispatcher System – Installation, Operation and Maintenance

Course description
This training session is focused on the global Dispatcher System, its concept, installation, configuration, operation and maintenance.

Audience
Maintenance Staff, Operations

Objectives
At the end of this training you will be able to:
> Understand the concept behind of the Dispatcher System;
> Know the functionalities of the Dispatcher System;
> Understand the installation of the Dispatcher System;
> Know how to install it;
> Understand the configuration of the Dispatcher System;
> Know how to configure it;
> Know how to use the OMC application;
> Know the Activity Reports.

Prerequisites
GSMR01 – GSM/GSM-R Overview

Duration
2 days

Method
> Lecture
> Demonstration
> Hands-on

Key topics
> Introduction
  - Objectives
  - Contents
  - Documentation
  - Attendees presentations and expectations

> Dispatcher System Overview
  - High level view and concept
  - Architecture
  - Functionalities

> Dispatcher System installation
  - Components
  - Installation

> Dispatcher System Configuration
> Dispatcher System operation and maintenance
  - OMC application
  - Activity reports
DISP02 Dispatcher Advanced Operation

Course description
This training session is focused on the Dispatcher component and how to operate it.

Audience
Maintenance Staff, Operations

Objectives
At the end of this training you will be able to:
> Identify the Dispatcher GUI application and its operational areas;
> How to make outgoing calls of the different types;
> How to accept/reject incoming calls of the different types;
> How to manage calls;
> How to send Status Messages;
> Understand the trains list, group areas list, alarm group areas;
> Understand the roles assigned to the Dispatcher.

Prerequisites
GSMR01 – GSM/GSM-R Overview
DISP01 – Dispatcher System Installation, Operation and Maintenance

Duration
1 day

Method
> Lecture
> Demonstration
> Hands-on

Key topics
> Introduction
  - Objectives
  - Contents
  - Documentation
  - Attendees presentations and expectations
> Dispatcher System Overview (if needed)
  - High level view and concept
  - Architecture
  - Functionalities
> Dispatcher Operation
  - Graphical User Interface
  - Functionalities
Intentionally blank