

GSM – Signaling & Protocol Analysis – The Core Network

Course Duration:

4 days

Course Description:

- ▶ This course addresses the needs of engineers and technicians who are already experienced in SS7, SS7-application protocols and GSM-core networks.
- ▶ This part of the course is rather dedicated to the signaling procedures among the various network elements within the GSM core network and towards outside networks.
- ▶ This includes the core network procedures for CAMEL, SS- and SMS-handling.

As in all INACON courses we integrated several interactive exercises for a perfect learning experience.

Pre-Requisites:

- ▶ Very good understanding of GSM networks and GSM call processing.
- ▶ Detailed understanding of SS7-protocols and protocol operation.

Course Target:

- ▶ The student will be enabled to understand all important aspects of GSM core networking and GSM signaling procedures within the core network.

Some of your questions that will be answered:

- What is CAMEL and how does it work?
- How do I analyse and interpret MAP-recording files?
- When and why are SCCP connection-less or connection-oriented services used by higher layers?
- How and when are mobile terminating short messages transferred, if the subscriber is not reachable?
- How can I use short dial codes e.g. for voicemail access even while I'm roaming?

Who should attend this class ?

- Operations staff of GSM-core network equipment
- Design and test engineers of core network related GSM-hardware and software
- Everybody who requires a detailed understanding of MAP signaling procedures

***“It is fascinating to suddenly understand all these really complex procedures. This course is a must for everybody who shall trouble-shoot GSM-signaling problems. I hope they do have a similar course for my colleagues on the radio side.”
(T-MOBILE)***

Table of Contents:**The GSM-Network and its Features**

- ▶ **The GSM-Network Architecture** / Tasks and functions of BSS, MSC, IWF, VLR, HLR, EIR, SMS-SC, Voicemail.
- ▶ **Features of GSM** / Functional Description of national and international roaming, Mobile Originating Call (MOC), Mobile Terminating Call (MTC), Interworking with data networks, Short Message transfer in mobile originating and mobile terminating direction (SMS), Supplementary Service features and Supplementary Service (SS) handling.
- ▶ **The Future of GSM** / Introducing GPRS, EGPRS and UMTS

Practical and Interactive Exercises**The SS7-Protocol Stack: MTP 1 – 3, ISUP and the SCCP**

- ▶ **The SS7-Network** / Tasks, functions and differences between SP's, SCP's and STP's, the IN-concept.
- ▶ **The SS7-Protocol Stack** / Introduction and differentiation of MTP 1 – 3, ISUP, TUP, SCCP, TCAP, MAP
- ▶ **The Message Transfer Part (MTP 1 – 3)** / Functional description and procedures, FISU, LSSU, MSU, Routing Label.
- ▶ **SS7 Network Management and Network Test** / Functional description and procedures, message format and message types
- ▶ **The ISDN User Part** / Functional description and procedures, message format and message types, important parameters for call setup and release
- ▶ **The Signaling Connection Control Part (SCCP)** / Functional description, the SCCP-subsystems, message format and message types, connection-less and connection-oriented services, SCCP-parameter description.

Practical and Interactive Exercises /**Error Analysis of Real Life Recording Files for MTP 3, ISUP and SCCP**

The SS7-Protocol Stack: TCAP & MAP

- ▶ **Transaction Capabilities Application Part (TCAP)** / Functional description, parameter encoding and classes (primitives vs. constructors), structured dialog vs unstructured dialog, introduction to ASN.1 encoding, message format and message types, dialog portion, component portion, addressing principles of TCAP.
- ▶ **Mobile Application Part (MAP)** / Functional description, common and special MAP-services (MAP-DELIMITER, MAP-OPEN, MAP-CLOSE, MAP-U-ABORT, MAP-P-ABORT, MAP-NOTICE), local operation codes for GSM, interaction between application, MAP and TCAP.

Practical and Interactive Exercises /

Analysis of Real Life Recording Files for TCAP and MAP

CAMEL

- ▶ **CAMEL Basics** / Phase 1, Phase 2, Phase 3 functional description, features and architecture (gsmSSF, gsmSRF, gsmSCF)
- ▶ **CAP (Camel Application Part)** / Procedures for Mobile Originating and Mobile Terminating Calls, procedures for SMS, procedures for pre-paid services.

Practical and Interactive Exercises /

Analysis of Real Life Recording Files for CAMEL

Signaling Procedures & Functions

- ▶ **Registration and Location Updating** (Intra-PLMN and Inter-PLMN with CAMEL-Interworking)
- ▶ **Mobile Originating Call Setup** (Intra-PLMN and Inter-PLMN with CAMEL-Interworking for pre-paid services)
- ▶ **Mobile Terminating Call Setup** (Intra-PLMN and Inter-PLMN with CAMEL-Interworking)
- ▶ **Inter-MSC Handover and Subsequent Handover Function**
- ▶ **Short Message Transfer** (subscriber reachable and non-reachable)
- ▶ **Supplementary Services Handling** (Activation, Registration and Interrogation)

Practical and Interactive Exercises /

Analysis of Real Life Recording Files for the different scenarios