



Who Should Attend?

This course is intended for network engineers and network planning staff who need deep technical knowledge of the functionality of CAMEL and IN services. It is strongly recommended for engineers who test, implement, or troubleshoot pre-paid and VPN roaming.

Course Scope

1. CAMEL Phase 1: GSM Network Nodes, Call Forwarding, IN nodes – SSF/SSP, SCF/SCP, SDP; Protocol Overview, BCSM Principles, Cross PLMN Boundary Protocols.
2. CAMEL Phase 2: Full Roaming, Pre-paid Charging, User Interaction, SSIN, USSD, Supported CAP Operations, Cross PLMN Boundary Protocols.
3. Mobile Call Cases: Mobile Originating Call, Mobile Terminating Call, Mobile Forwarded Calls (early and late forwarding).
4. Charging: MO Call and MT Call cases.
5. Special CAMEL features: Any Time Interrogation, Unstructured Supplementary Service Data, Supplementary Service Invocation, Short Forwarded-to-Numbers.
6. CAMEL Subscription Information: Phase 1 (O-CSI, T-SCI), Phase 2 (TIF-CSI, SS-CSI, USSD-CSI), Phase 3 (D-CSI, SMS-CSI, GPRS-CSI, M-CSI).
7. CAMEL Standard Evolution Path: CAMEL Phase 1 – GSM R96, CAMEL Phase 2 – GSM R97/R98, CAMEL Phase 3 – GSM R99. Comparison to INAP Capability Sets.
8. Signalling: CAP/MAP Signalling Principles, CAP Signalling over SS7, SSN Usage.
9. CAMEL Phase 3: New IN Features, CAMEL Inter-working with GPRS, MO SMS, Mobility Management and Location Services.
10. CAMEL Phase 4: New and Enhanced Functionalities.
11. USSD Call Back Solution as an alternative for CAMEL roaming.

Course Objectives

CAMEL Technology is an intermediate technical course covering all aspects of CAMEL architecture and functionality (e.g. protocols, messages, signalling procedures, basic call state models, subscription information, inter-working between GSM/CAMEL entities, CAMEL based services and international roaming). It presents different phases of CAMEL, with the main focus on CAMEL Phases 1 and 2.

Prerequisites

Prior to attending this course, the participants should already have an understanding of the architecture of GSM/UMTS system and a basic knowledge on communications in mobile networks. Practical experience in GSM/UMTS is recommended.



Training Structure

Three-day training divided into logical sessions.

Methodology

Lectures and theoretical exercises. Real CAMEL and MAP traces analyses. Example printouts from network nodes.