

Course ID  
**CAMEL**  
Course Duration  
**3 days**

Course Title  
**CAMEL for Intelligent Networks: Value-Added Services for GSM, GPRS and UMTS**

**Aimed At** The standard presentation of this course assumes a bachelor of science in Electrical Engineering, Mathematics, Physics, or a related subject along with an appropriate background in communications.

**Group Size** 5-25

**Prerequisites**

- GSM: Network Architecture, Operation, and Design (GSM-I, 5 days)
- GPRS: Network Architecture, Operation, and Design (GPRS, 3 days)
- EDGE: Network Architecture, Operation, and Design (EDGE, 2 days)
- UMTS-FDD: Network Architecture, Operation, and Design (UMTS-FDD, 3 days)

Since CAMEL builds on GSM, GPRS, and UMTS, a good knowledge of those technologies, which may be gained by taking the above courses or through equivalent experience, is required.

**Course in a Nutshell** Customized Application for the Mobile network Enhanced Logic, or CAMEL for short, is an important standard for intelligent mobile communications networks. Now under deployment worldwide, CAMEL enables mobile network operators to offer value-added services quickly and efficiently.

In this course, you will undertake a comprehensive study of this key technology. You will begin by understanding what intelligent networks are and how they evolved. You will learn the essential concepts and principles that underlie this technology. You will also study, in depth, all of the pertinent standards and specifications. You will learn not only how CAMEL works but also why it works the way it does. Throughout the course, you will receive practical guidance on how to design and deploy CAMEL networks. We will conclude with a discussion of the future of this technology. Whether you are a wireless or network design engineer, “service network” planner, or software/device designer, this course will help you master the powerful features of today’s advanced intelligent networks that are made possible by CAMEL.

### Customize It!

- *Are you involved with network service logic design?* If so, we can gear the course toward your knowledge/skills needs ranging from the basics of call control to the depth of complicated logic creation for GSM, GPRS and UMTS.
- *Are you a wireless or network engineer* who would like to catch up with the state-of-the-art of intelligent networks? Let us know so we can focus on the areas that interest you the most.
- *Are you a GSM or UMTS installer* who would like to learn the key concepts and theory that underlie your craft? If so, we can tailor the course to your background and needs.
- *Are you a manager, executive, or sales person* whose work involves Intelligent Network systems? If so, we can emphasize those parts of the course that deal with the markets and applications pertinent to your project or product.
- *Are you equipment and application developer* engaged in developing wireless devices, products, or services for the wireless industry? If so, we can turn this into a crash course on all that you need to know about CAMEL to get your job done.
- *Not familiar with GSM, GPRS, or UMTS?* No problem, we can extend this course as required to cover the necessary prerequisites before we get into a discussion of CAMEL.

### Learn How To

- Describe what intelligent networks are and how they evolved.
- Explain the conceptual and theoretical underpinnings of CAMEL.
- Understand the key components of CAMEL as they relate to intelligent networks and how they fit together.
- Describe the various phases and feature of CAMEL.
- Identify and implement the applications of CAMEL based networks.
- Design service logic using the CAMEL functionality.

### Course Outline

- Introduction to GSM Networks
  - Signaling in GSM
  - GSM Mobility and Mobile Station
  - Identifiers in the GSM Network
  - International Mobile Subscriber Identity
  - Mobile Station Integrated Services Digital Network Number (MSISDN)
  - International Mobile Equipment Identifier
  - Mobile Station Roaming Number
  - Basic Services
  - Supplementary Services
- Introduction to Intelligent Networks
  - History of Intelligent Networks
  - Principles of Intelligent Networks
  - Service Switching Function
  - Service Control Function

- Basic Call State Model
- Evolution of the CAMEL Standard
- Third-generation Partnership Project (3GPP)
- CAMEL Standards and Specifications
- Principles of CAMEL
- Location Update Procedure
- CAMEL Application Part
- Signaling for CAMEL
- Message Transfer Part
- Signaling Connection Control Part
- Transaction Capabilities
- Dynamic Load Sharing
- Using Signaling Point Code for Addressing in HPLMN
- CAMEL Phase 1
  - Architecture for CAMEL Phase 1
  - Functional Entities and Information Flows
  - Feature Description (MO, MT, MF calls)
  - Subscription Data (O-CSI and T-CSI)
  - Basic Call State Model
  - CAMEL Application Part
  - Service Examples
    - Virtual Private Networks
    - Prepaid Route
    - Short Number Dialing with CLI
- CAMEL Phase 2
  - Introduction
  - Architecture for CAMEL Phase 2
  - Functional Entities and Information Flows
  - Feature Description
    - Online Charging Control
    - Notifications
    - Call Control
    - Conditional Triggering
    - USSD
  - Subscription Data (O-CSI, T-CSI and USSD-CSI etc)
  - Basic Call State Model
  - CAMEL Phase 2 Relationship
  - Interaction with GSM Supplementary Services:
    - Call Forwarding
    - Explicit Call Transfer
    - Call Waiting
    - Call Hold
    - Completion of Calls to Busy Subscribers
    - Multiparty
    - Closed User Group
    - Call Barring
    - Basic Optimal Routing

- Immediate Service Termination
- Operator-determined Barring
- High-speed Circuit-switched Data
- Multiple Subscriber Profile, etc.
- CAMEL Phase 3
  - General Third-generation Networks
  - UMTS Network Architecture
  - 2G Cell Planning vs 3G Cell Planning
  - CAMEL Phase 3 Features
  - Call Control
  - CAMEL Control of GPRS
  - CAMEL Control of MO-SMS
  - Mobility Management
  - Active Location Retrieval
  - Subscription Data Control
  - Enhancement to USSD
  - Pre-paging
- CAMEL Phase 4
  - General Introduction
  - Call Control
  - GPRS Control
  - SMS Control
  - Mobility Management
  - Any-time Interrogation
  - Subscription Data Control
  - Mobile Number Portability
  - Control of IP Multimedia Calls
- Charging and Accounting
  - Architecture
  - Call Detail Records (CDR' s)
  - Transfer Account Procedure Files (TAP)
  - Inter-operator Accounting of CAMEL Calls
  - Correlation of Call Detail Records
  - Global Call Reference
  - Call Party Handling CDR' s
- A Look Ahead: 3GPP and Beyond
  - General Introduction
  - Enhancements to 3GPP Release-6
  - Enhancements to 3GPP Release-7
- Wrap-up
  - Course Recap
  - Q/A
  - Evaluations

**How You Will  
Learn**

- A seasoned instructor will present this course in interactive lecture format
- Along with lecture, we use exercises, case studies, and interesting group activities to enrich the instruction and drive home the essential points.
- If you already know something about the technology, we will build on that. We'll compare and contrast what's familiar with what's a new, making new idea easier to learn as well as more relevant.
- If your background is less technical, we will use meaningful and ingenious examples and analogies to simplify the complex subject matter.
- You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and apply it on your job.

*Revised*

*Sept. 13, 2006*