

# INAP and CAMEL Training

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## OVERVIEW

The goal of the **Intelligent Network (IN)** concept was to decouple services and features from the switches themselves - that is separate service intelligence from the switching functions. This was to allow network operators to be able to develop and deploy services and features independently of the switch vendors, allowing more versatility in service development, simplified rollout, reduced costs and greater autonomy.

To this end the **Intelligent Network Application Protocol (INAP)** was developed for fixed line networks. INAP is the primary protocol used for fixed line IN outside of North America.

**Customised Applications for Mobile Enhanced Logic (CAMEL)** provides standardised intelligent network capabilities for GSM networks. It was based upon core INAP with modifications to take into account subscriber mobility.

## PREREQUISITES

The course assumes that the delegates have some familiarity with signalling system #7 (SS7/C7) and basic telecommunication concepts. It is recommended that previous attendance at the 5-Day SS7/C7 to Binary Level (course code SS7-B) has been made, although this is not compulsory.

## TRAINING METHOD

- # Lectures
- # Exercises
- # Demonstrations
- # Training documentation
- # Windows® based software for protocol analysis. SS7/C7 log files will be studied that will be distributed in electronic format. It may be beneficial if participants bring notebooks with Windows 98/NT/2000/ME.

## COURSE DETAILS

- # Duration: **Two days**
- # Language: English
- # Documentation: English
- # Participants: General class size 5-10

## WHO SHOULD ATTEND

- # Those requiring an understanding of how value added services can be provided within modern telecommunication networks using the Intelligent Network concept
- # Those requiring knowledge of how value added services can be implemented within wireline networks in accordance with the Intelligent Network and INAP framework
- # Those requiring knowledge of how value added services can be implemented within cellular networks in accordance with the Intelligent Network and CAMEL framework
- # Engineers, who are involved in Intelligent Network services design and testing
- # Non-engineers requiring a technical appreciation of wireless/wireless intelligent networking

## CONTACT

**Lee S Dryburgh**

Lead author of **Signalling System No. 7 (SS7/C7): Protocol, Architecture, and Services.**

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## PRESENTER DETAILS

The course is delivered by **Lee S Dryburgh**, lead author of **Signalling System No. 7 (SS7/C7): Protocol, Architecture, and Services**.

### HIGHLIGHTS FROM HIS CAREER INCLUDE:

- # Graduated in Computer Science then specialised in **signalling** for nearly a decade, with the main emphasis on the protocol used in 99% of networks - **signalling system #7 (SS7)**.
- # Was a **SS7/C7** software engineer covering virtually every **SS7/C7** layer/applications - **MAP, TCAP, SCCP, INAP, ISUP, MTP, IS-41, BSSAP** and standards **ETSI, ANSI, Bellcore** and **ITU**. For example he wrote the software decode for the **Chinese INAP**. He worked as a software engineer for both the **acceSS7** and **HP3900** platforms.
  - Was a protocol software engineer responsible for a proprietary **telecommunications protocol system** involving communications between transactions terminals out in the field and a central **UNIX** host.
  - Played a leading role in achieving **national SS7/C7 certifications** for a switch and a softswitch produced by a major Internet equipment manufacturer.
  - Performed switch installations as well as post installation **SS7 testing**.
  - Performed **SS7/C7** testing for many variants including **Swedish ISUP, UK ISUP, NUP/IUP** and **Russian ISUP** in addition to the more common **ITU** and **ANSI** protocols.
  - Performed testing against one of the world's most complex **Intelligent Network (IN)** platforms, certifying the **SCCP** and **TCAP** **SS7/C7** protocols.
  - Has unique knowledge of **SS7/C7 Security** aspects and provides consulting on signalling security issues largely to parties involved in **VoIP** and **3G** implementations.
- # Since the **initial 3G rollouts** in 2001 has provided hands on **2/2.5** and **3G** support and later service additions as well as **3GPP** lead architecture changes. Such support has included **SS7, SIP, H.323, CODECs/transcoding** and **softswitch** management.
- # Has been working in **Next-Generation Network (NGN)** environments since first rollouts in 2004.
  - Wrote and performed **SS7 to SIP interworking** tests.
  - Dealt with signalling issues such as **SIP/H.323/SS7 interworking** for **PSTN** calls.
  - Tested **3G services** such as video calling and location based services which require such **signalling interworking**.
  - Managed **softswitches** and **media gateways** since 2004.
  - Played a leading role in **BICC/ISUP/SIP interworking** verification for a **softswitch** produced by a major telecoms equipment vendor.
  - He is currently authoring another book on **next generation** signalling systems including **NGN protocol interworking with SS7/C7**.
- # Has spent **7+ years** delivering **signalling related training on an international basis**. He currently provides training in **SS7, C7, INAP, CAMEL, MAP (GSM and ANSI-41), SIGTRAN (M3UA, M2UA, SUA, M2PA), H.323, SIP, P2P SIP, NGNs** as well as issues related to the future of telephony.
- # He is working on an Engineering Doctorate in conjunction with the University College of London (UCL) mapping out the **future of telephony** and trying to **foresee killer applications and required protocols**.
- # He is a member of The Institution of British Telecommunications Engineers (IBTE), The Professional Contractors Group (PCG), The Federation of Telecommunications Engineers of the European Community (FITCE), The British Computer Society (BCS), The Institution of Electrical Engineers (IEE) and The Institute of Electronic and Electrical Engineers (IIEEE).

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## COURSE CONTENTS

### DAY 1 INTELLIGENT NETWORKS AND INAP

#### DAY 1 LEARNING OUTCOMES

#### DAY 2 INAP AND CAMEL

#### DAY 2 LEARNING OUTCOMES

### DAY 1 INTELLIGENT NETWORKS AND INAP

- # Intelligent Network Definition
- # Business Drivers for IN
- # IN Objectives
- # IN History/Evolution
- # Freephone Service Example
- # Premium Rate Service Example
- # Televoting Service Example
- # Automatic Alternate Billing Example
- # Intelligent Network Standards
- # Intelligent Network Conceptual Model (INCM)
  - Service Plane
  - Global Functional Plane
  - Distributed Functional Plane
  - Physical Plane
  - INAP/AIN/CAMEL/MAP/WIN and the INCM
- # Intelligent Network Call Modelling Concepts
  - SS7/C7 Nodes
  - IN functional Entities (SCF, SDF, SSF, CCF, SRF, SCEF, SMF)
  - Basic Call State Modem (BCSM)
  - Detection Points
  - Triggers
  - Originating BCSM
  - Terminating BSCM
  - Service Creation

- # General Structure of the Capability Sets
- # Capability Set 1 (CS-1)
  - Scope of CS-1
  - CS-1 Service Features
  - Feature Interactions
  - Example Services
- # Capability Set 2 (CS-2)
  - Scope of CS-2
  - Enhancements that CS-2 has brought to the INCM
  - Example Services
- # Capability Set 3 (CS-3)
  - Scope of CS-3
- # INAP Protocol Definition
- # INAP Standards
- # INAP ASN.1 Descriptions
- # Non-Circuit Related Signalling
- # NCR Applications
- # Formatting of Information Flows (IF)
- # ASN.1
- # Initial DP ASN.1 Encoding
- # Transaction Capabilities (TC)
- # Component Sublayer (CSL)
- # Transaction Sublayer (TSL)
- # SCCP Addressing
- # Network Services Part (NSP)
- # INAP Protocol Architecture
- # CoreINAP Overview
- # Tutorial #1.

## DAY 1 LEARNING OUTCOMES

- # Understand the general goals and benefits of IN
- # Be able to identify the main IN-based Supplementary Services
- # Appreciate the definitions and origins of Intelligent Networks
- # Understand the basic structure and implementation of IN
- # Understand the significance of Capability Sets
- # Appreciate the terminology used in IN
- # Be able to reference the ITU recommendations
- # Be able to differentiate between Conventional and Intelligent Network methods of Service Creation
- # Understand the role of SIBs and GSL in Service Creation
- # Be familiar with the Service Creation process
- # Know the main components required to implement and manage services
- # Be familiar with the IN Conceptual Model
- # Understand the components which make up the CS-1 INCM
- # Understand how SIB procedures can be combined to provide a service
- # Recognise Abstract Syntax Notation 1 (ASN.1) encoding and extract required information
- # Know what mode SCCP operates in supporting non-circuit related applications as well as SCCP addressing functions
- # Understand TCAP and its relevance to non-circuit related applications.

## DAY 2 INAP AND CAMEL

- # Single/Multiple Association Control Function (SACF/MACF) Rules
- # INAP Addressing
- # INAP Formats
- # INAP Procedures
  - ASE Types
  - Operations
- # Translation Example
- # Translation with Announcement Example
- # Translation with User Interaction Example
- # Call Gapping Example
- # Credit Card Example
- # Introduction to CAMEL
- # Pre-WIN/CAMEL Alternatives
  - TCAP Signalling
  - ISUP Call Control Solutions
  - Other Alternatives
- # CAMEL Standards
- # CAMEL Phase I
- # CAMEL Phase II
- # CAMEL Phase III
- # CAMEL Trigger Detection Points
- # Service and Feature between Incompatible Networks
- # Implementation Issues
- # Operational Issues
- # Tutorial #2.

## DAY 2 LEARNING OUTCOMES

- # Understand INAP formats, addressing and procedures
- # Identify the need for CAMEL
- # Understand the problems associated with implementing IN into GSM networks and how CAMEL proposes to solve them
- # Be familiar with the scope and timescales of Phase 1, 2 and 3 of CAMEL
- # Know the CAMEL Architecture
- # Understand the procedures involved in CAMEL Phase 2 and 3
- # Understand Number Portability and how IN can be used to address the problem.