Signalling System #7 (SS7/C7) General Overview Training

OVERVIEW

Signaling System #7 (SS7) (AKA C7 outside N.America) is the predominant signalling system for the public switched telephone network (PSTN) and also **Public Land Mobile Networks** (PLMNs). New packet networks for voice telephony also typically rely on **SS7** for signalling.

SS7 defines the procedures for setting-up, managing and clearing down calls between users, as well as non-circuit related signaling. For example it is used to provide **Local Number Portability** (LNP) as mandated by the FCC, **Call Management Database Services** (CMSDB) such as **800**,**900**, and **500** services (0500,0800,0898 Etc within the UK), and Line Information Database Services (LIDB) such as calling card services.

The SS7 protocol is also a key component in providing **Advanced Intelligent Networks** (AINs) as defined by Bellcore and Intelligent Networks as defined by **ITU-T**.

TRAINING METHOD

- Lectures
- Exercises
- Demonstrations

COURSE INFO

- Duration: **One Day**
- Language: English
- Documentation: English
- Participants: No limitation

WHO SHOULD ATTEND

- Technical development and support professionals involved in the support and implementation of networks and services who wish to have a general appreciation of SS7 concepts and terminology
- Planners and developers of packet based carrier grade networks and services that wish to have a basic grasp of the purpose of SS7 and associated terminology

PREREQUISITES

The course has no prerequisites, although a **technical understanding of voice networks and associated technology** would be beneficial.

CONTACT

Lee S Dryburgh

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

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LEARNING OUTCOMES

Knowledge of C7/SS7 Architecture Including Signaling Points and Links
Ability to Define Signal Unit Structure
Knowledge of what Function MTP Performs
Knowledge of what Function the User Parts for Fixed Line Perform
Ability to Explain ISUP Message Format and Describe Basic Messages
Knowledge of what Function SCCP Performs Including SCCP Classes
Knowledge of what Function TCAP Performs
Knowledge of what an IN is and what the Associated Standards are
Knowledge of what the Wireless User Parts are and their functions

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 (IEEE).

COURSE CONTENTS

WHAT IS SIGNALING?

- # What is Signaling?
- # What is the Purpose of Signaling
- # Where does C7/SS7 Signaling Take Place?

SS7/C7 NETWORK ELEMENTS

- # The Three Types of Signaling Point (SP) Explained
- # Links and Linksets Explained
- # The N.American SS7 Network Architecture Shown
- # The UK C7 Network Architecture Shown

SS7/C7 OVERVIEW

- # The C7/SS7 Protocol Stack compared with the OSI Model Shown
- # C7/SS7 Functionality Overviewed
- # Requirements of C7/SS7 Signaling
- # Advantages of C7/SS7 Signaling
- # Associated Mode
- # Quasi-Associated Mode
- # Who are the C7 and SS7 Protocol Standards Bodies?

MESSAGE TRANSFER PART 1 (MTP 1)

- # MTP 1 Overviewed

MESSAGE TRANSFER PART 2 (MTP 2)

- # MTP 2 Overviewed
- # Signal Units and the Three Types Explained
- # SU Layers of Operation Shown
- # MTP 2 Overhead Shown
- # SU Delimination Described
- # SU Error Detection/Correction Explained

- # Basic Error Correction Method Shown
- # Link Error Monitoring Described
- # Link Initial Alignment Shown

MESSAGE TRANSFER PART 3 (MTP 3)

- # Functions of MTP 3 Described?
- # MTP 3 Overhead Shown
- # Signaling Information Field (SIF) for MTP 3 MSUs Shown
- # Contents of Service Information Octet (SIO) Explained
- # Service Information Octet (SIO)- SubService Field (SSF) Shown
- # Service Information Octet (SIO)- Service Indicator (SI) Shown
- # The ITU Routing Label Described and Shown
- # The ANSI Routing Label Described and Shown
- # The UK Routing Label Described and Shown
- # International/National SS7/C7 Networks Hierarchy Explained
- # Relationship between L1, L2 and L3 Shown
- # Signaling Network Management (SNM) Overviewed
- # Signaling Message Handling (SMH) Overviewed
- # MTP Summarised

FIXED LINE USER PARTS

- # User Parts Described
- # TUP Overviewed
- # NUP/IUP Explained
- # Two NUP Call Sequences Shown
- # N-ISDN User Part (N-ISUP) Overviewed
- # Signaling Information Field (SIF) for N-ISUP MSU Shown
- # N-ISUP Evolution Explained
- # N-ISUP Variants Discussed
- # N-ISUP Message Groups Shown
- # Five N-ISUP Messages Explained/Shown
- # Two Call Sequences Shown
- # Supplementary Services Described

SIGNALING CONNECTION CONTROL PART (SCCP)

- # Signaling Connection Control Part Overviewed
- # Two Categories of Service and Four Protocol Classes Decribed
- # Connection Orientated Procedures - Example
- # Connectionless Procedure - Example

INTELLIGENT NETWORKS (INS)

- # Intelligent Networks (INs) Described
- # IN Standards Described

TRANSACTION CAPABILITIES APPLICATION PART (TCAP)

- # Transaction Capabilities Application Part (TCAP) Overviewed
- # TCAP Definitions Detailed
- # Components/Transactions Described
- # The Transaction Capabilities (TC) Described

WIRELESS USER PARTS

- # MAP Described
- # BSSAP Described
- # BSSMAP Described
- # DTAP Described

SS7/C7 PROTOCOL STANDARDS AND RECOMMENDATIONS

- # C7 Protocol Standards - Europe/Britain Detailed
- # SS7 Protocol Standards - Europe/N.America Detailed

APPENDICES

- # Appendix A - SS7/C7 Standards
- # Appendix B - Further Reading