NGN Signalling: SIGTRAN, SIP, H.323 Training

OVERVIEW

This course is aimed at providing the student with a detailed overview of the control (signalling) protocols emerging in Next Generation Network (NGN) architectures including interworking both within and outwith NGNs.

For over two decades telecommunication networks have been adopting Signalling System #7 (SS7/C7) for the exchange of control information (signalling) between network entities. The ubiquitous deployment of SS7/C7 will become something of the past as control protocols suited for NGN packet based telecommunications are rolled out eating into former SS7/C7 space.

NGNs introduce greater technical complexity including more protocols. Many of the protocols are complimentary in nature, whereas others are directory competitive. In terms of NGN signalling protocols, the protocols may be used in various complimentary configurations, but in other scenarios the protocols compete with each for dominance. The course aims at arming the student with the knowledge of what protocol may be used where, how and why, along with some protocol specifics.

It is critical that those involved with telecommunications understand the revolution taking place. For those involved in telecommunications on a deeper level it is critical to understand the emerging NGN protocols; their purpose, pros and cons, associated architectures, background, future deployment and interworking scenarios.

The course provides an overview of the packet based signalling protocols: SIGnaling TRANsport (SIGTRAN), H.323, Session Initiation Protocol (SIP), and Bearer Independent Call Control protocol (BICC). The overviews are provided in an integrated way so that students should understand how the protocols relate to each other, how they may work together, protocols specifics, service possibilities and interworking methods both between themselves, the current PSTN and their use within third generation (3G) cellular networks.

PREREQUISITES

The course assumes that the delegates have familiarity with telecommunication and datacommunication concepts.

TRAINING METHOD

- Lectures
- Exercises

COURSE INFO

- Duration: **Two Days**
- Language: English
- Documentation: English
- Participants: Generally class of five on a public course

WHO SHOULD ATTEND

- Engineers, who are involved in design and testing of NGN products and services
- Non-engineers requiring a technical appreciation of NGN protocols
- Engineers who wish to cross-train to meet the challenges of the revolution taking place in telecommunications
- Network architects, designers, planners, product managers, and operational support staff who require an understanding of next generation networks
- Those interested in the telecommunication and datacommunications convergence

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 (IEEE).

COURSE CONTENTS

DAY 1 NGN INTRODUCTION, SIGTRAN AND SIP OVERVIEW

Architecture
  - Components
    - Signalling Gateway (SG)
    - Signalling Gateway Process (SGP)
    - Application Service Process (ASP)
    - IP Signalling Point (IPSP)
    - Application Server (AS)
  - Routing
    - Interface Identifiers
    - Routing Contexts
    - Network Appearances

Introduction to Signalling and Signalling History

Next-Generation Networks
  - Definition and Purpose
  - NGN Architecture
    - Media Gateway (MG)
    - Media Gateway Controller (MGC)
    - Signalling Gateway (SG)

SigTran Overview
  - History and Purpose
  - Stream Transmission Control Protocol (SCTP)
  - Architecture
    - Components
      - Signalling Gateway (SG)
      - Signalling Gateway Process (SGP)
      - Application Service Process (ASP)
      - IP Signalling Point (IPSP)

        - Application Server (AS)
    - Routing
        - Interface Identifiers
        - Routing Contexts
        - Network Appearances
- User Adaptation (UA) Layers
    - UA Terminology
    - MTP Level 2 User Adaptation (M2UA)
    - MTP Level 3 User Adaptation (M3UA)
    - SCCP User Adaptation (SUA)
    - MTP Level 2 Peer Adaptation (M2PA)
- M2PA and M2UA Comparison
- M2PA Differences from Other UAs
- Example Sequences

SIP Overview

- History and Purpose
- Architecture
    - User Agent Server (UAS)
    - User Agent Client (UAC)
    - Redirect Sever
    - Proxy Server
    - Registrar Server
- SIP Messages
- General/Entity Headers
    - Requests
    - Request Headers
    - Responses
    - Response Headers
- Addressing
- Example Sequence - no proxy
- Example Sequence - with proxy
- RTP Basics
- SDP Basics
- SIP-ISUP/BICC Interworking
    - Testing
    - Examples
- Firewall and NAT Traversal
- Authentication and Authorization
- Logging
- Billing Issues
- Loading Balancing
- Forking
- Third Party Call Control
- SIP in UMTS
    - 3GPP Release 5 Architecture
- SIP-T

DAY 2 H.323, BICC OVERVIEW, RELATED WORK, SUMMARY

H.323 Overview
- History and Purpose
- Timeline
  - Revision 1
  - Revision 2
  - Revision 3
  - Revision 4
  - Revision 5
- Architecture
  - Endpoint
  - Gatekeeper (GK)
  - Multipoint Conference Unit (MCU)
- Example Scenarios
- Protocol Stack
  - H.225.0 RAS
    - RAS Messages
    - Main RAS Message Fields
    - Example - GK Routed RAS Call
  - H.225.0 Call Signalling
    - Q.931 Messages
    - Q.932 Messages
    - Example - Call Setup
  - H.245
    - Message Types
    - Terminal Capabilities
  - H.235
  - H.450.x
- Direct H.323 Call
- Gatekeeper Administration
- Inter Gatekeeper Communication
- ISUP Tunnelling

BICC Overview
- History and Purpose
- Documentation Structure
- Architecture
  - Call Node Types
  - Functional Entities
  - Interfaces
- Protocol Stack
- UMTS-GSM Interworking
- Capability Set (CS) 1
- Capability Set (CS) 2
- Capability Set (CS) 3
- Capability Set (CS) 4
- Example Message Flows

Related Groups of Interest
- SIMPLE
- IPTEL
- SIPPING
- SPIRITS
- PINT
- ENUM
- TIPHON
- TISPAN
- OSA and PARLAY

Course Summary
- Pros and Cons of Each Protocol
- The Road Ahead