

Core Network Signalling – C7 (SS7)

At the heart of the Public telecommunications network lies a complex signalling system allowing them to efficiently offer the enormous ranges of services available to users. This bTOO Training course is aimed at anyone involved with the operation or management of the Public Switched Telephone Network, a Public Land Mobile Network or an Intelligent Network. The course concentrates on C7 (SS7) as a technology and its uses within modern networks allowing the delegate to gain a solid understanding of the C7 protocol and its main applications within today's networks.

Frequently Asked Questions introduced and discussed on this course include:-

How long has C7 been in use and what is it used for?

A brief look at the history of signalling brings the delegate to the present date. This provides a background to its early implementation and adoption as the primary signalling system in use today. The various applications of C7 in different networks are introduced.

Key Terms introduced are applications in public, mobile and intelligent networks.

How is the C7 protocol constructed?

This C7 protocol stack, comprising four layers is covered in detail. A comparison is made between this and the OSI 7 layer model giving the delegate an overview of the different functional layers of C7. The purpose and application of each layer will be outlined using real examples.

Key Terms introduced are MTP, SCCP, TCAP, User part and application parts.

What types of message are used within the C7 protocol?

The three different types of signalling unit used within C7 are described in detail, down to bit level. Each signalling unit is used for a specific purpose and the delegate will be led through the function of each part of the signalling unit. The delegate will therefore see how the C7 protocol sequences, requests retransmission, identifies the user and reports the status of a signalling unit.

Key Terms introduced are BSN, BIB, FSN, FIB, SIO, SIF, FISU, LSSU and MSU.

How is a C7 signalling network constructed?

The signalling network is built using four different functional nodes and several different types of links. The nodes and architecture of a C7 network are discussed in detail, giving the delegate a sound knowledge of how the network fits together and an appreciation of the issues of redundancy and alternative paths required in a resilient network.

Key Terms introduced are SP, SSP, STP, SCP, Linksets and Routesets.

Can the C7 network manage itself?

No matter how secure and resilient a network has been designed to be, at times failures occur and congestion results. The C7 protocol has a built in management function to deal with and alleviate problems when these situations occur. The

operation of the network management function will be discussed in detail using examples.

Key Terms introduced are COO, CBD, TFA, TFP and TFR.

How are the C7 messages routed around the signalling network?

What differentiates C7 from its private network counterparts is the complexity of its routing mechanisms. The abilities of this key feature of the C7 protocol are described in detail using examples to show how messages are addressed and delivered. Various addressing labels will also be covered to give the delegate a complete view of this area of the C7 protocol.

Key Terms introduced are point codes, MTP routing, global title translations and subsystem numbers.

How is C7 used to set up and clear down a telephone call?

The message suite associated with C7 is very large and it differs depending on the various User Parts detailed. Being able to decipher a C7 protocol trace is essential to identifying faults and dealing with traffic management. The delegate is taken through the sequence of messages for successful call setup and clear-down in detail, along with how the messages would differ if a call failed.

Key Terms introduced are IAM, SAM, SASI, ASI, ACM and cause values.

What functions do SCCP and TCAP perform?

The application parts use SCCP and TCAP together to enable dialogue between different nodes and across networks. These higher layers are at times complex, therefore, the delegate will be led logically through both of these distinct layers. By describing the operation and functionality of these layers the delegate will be shown how the application parts interact with each other.

Key Terms introduced are SCCP management, SCCP routing, transaction and component sub layer.

What is C7 used for in Mobile networks?

Mobile networks use the C7 protocol extensively in their operation. Here we introduce the components of the cellular network and how they interact to provide the services offered by a mobile network. Having understood the different functional parts of the mobile system the delegate is then introduced to the events that rely on C7 for their successful completion. Overall the delegate will be given an understanding of the operation of C7 within this dynamic type of network.

Key Terms introduced are MAP, CM, MM, RR, BSSAP and MAP/E.

What happens when I take my mobile abroad, how does the signalling work?

When roaming abroad, a complex C7 message transfer takes place to identify the validity of the roaming mobile handset. The delegate is introduced to the MAP

messages, and how these messages are delivered across the globe. This brings together the layers SCCP, TCAP and MAP previously described to provide the delegate with the 'big picture' of a mobile network operation.

Key Terms introduced are E.164, E.212, HLR, Global Title Translation.

What relationship does C7 have with Intelligent Networks?

Without knowing it everyone has been a user of an Intelligent Network service, the freephone service is just one example. The delegate will be introduced to the IN architecture and the signalling required to support it. The current services available are explained, along with how C7 has made them possible.

Key Terms introduced are IN conceptual model, IN services and freephone.

What is INAP?

This application part is associated with the Intelligent Network platform as described earlier. The structure and operation of INAP will be detailed, using examples to track call setup across an Intelligent Network. Multi stage calls where user interaction is required are also discussed, using examples such as PIN number authentication.

Key Terms introduced are INAP and INAP commands.

How can we deal with the demands on signalling as our network grows?

As the scale of any network grows, so the related signalling overlay and capacity will increase. At some stage in time, nodes dedicated to signalling alone will have to be considered. The delegate is given an appreciation of the considerations required to build a secure and resilient signalling network, using a cost effective structure.

Key Terms introduced are network topology and STP working.

How can we monitor and test our C7 network?

There is a definite requirement to have some level of monitoring and at some time testing will be a necessity. The delegate is lead through the various testing methods and monitoring equipment types. Possible solutions to the question of testing and monitoring will be discussed, helping delegates to chose the best implementation for their network.

Key Terms introduced are MTP layer analysis, remote probes and techniques for testing.

What happens when we interface with a VOIP network?

VOIP solutions are now common within private networks. VOIP networks will at some stage in the future interface with the PSTN. Since C7 is a global standard, VOIP will need to interface with C7. The various methods for achieving this are highlighted, giving the delegate an overview of the signalling requirements associated with this leading edge technology.

Key Terms introduced are H323, MGCP, SIP, media gateways and signalling gateways.