LONDON CAPITAL COMPUTER COLLEGE

# Advanced Diploma in Routing & Switching (112) – Telephone Signalling System Technology

| **Prerequisites:** Networking knowledge. | **Corequisites:** A pass or higher in Diploma in IP Routing or equivalence. |
|---|---|

**Aim:** Common Channel Signalling System No. 7 (i.e., SS7 or C7) is a global standard for telecommunications defined by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T). The standard defines the procedures and protocol by which network elements in the public switched telephone network (PSTN) exchange information over a digital Signalling network to effect wireless (cellular) and wireline call setup, routing and control. In telephone network, the Signalling method that is used to provide control and management functions is called Common Channel Signalling (CCS). CCS includes addressing, call information and supervisory functions. It also determines the status of the network and control the amount of traffic. To carry Signalling messages CCS uses a separate out-of band Signalling network. Signalling between a Personal Communication Services (PCS) also known as Wireless services and the Signalling System No.7 (SS7) achieves the Public Switch Telephone Network (PSTN). Signalling System No.7 (SS7) is a CCS system. It is design and developed to improve the earlier Signalling system and it satisfy the requirements of the telephone companies. Earlier Signalling systems was not much sophisticated. Their service quality and coverage range was also not good. So to solve these problems we go towards SS7 network. SS7 can support both voice and data services at a much good rate.

The architecture of SS7 consists of three different elements and these network elements are used for interconnection between a PCS network and the PSTN: Service Switching Point (SSP); Signal Transfer Point (STP); Service Control Point (SCP). SS7 or Signalling System Number 7 is a set of protocols that describes a means of communication between telephone switches in public telephone networks.SS7 is a highly sophisticated and powerful form of Common Channel Signalling (CCS). The use of out-of-band Signalling procedures offers considerable benefits over and above other Signalling methodologies. The primary function of SS7 is to provide call control, remote network management, and maintenance capabilities for the inter- office telephone network. SS7 performs these functions by exchanging control messages between SS7 telephone exchanges (Signalling points or SPs) and SS7 Signalling transfer points (STPs). The switching offices (SPs) handle the SS7 control network as well as the user circuit switched network. Basically, the SS7 control network tells the switching office which paths to establish over the circuit-switched network. The STPs route SS7 control packets across the Signalling network. A switching office may or may not be an STP.

The course provides good understanding of the SS7 Signalling network, architecture and protocols. Upon completion of this course, the candidates will have a good understanding of: SS7 (Signalling System 7) Network Architecture; Signalling Network Elements: SSPs, STPs and SCPs; Signalling Network Structures; SS7 Protocols & Protocol Stacks; SS7 Signal Units; Signalling Links; Message Transfer Part (MTP) Level 1-3; SCCP, TCAP and ISUP; SS7 in Mobile Networks. Candidates can be existing or those intending to be Network & Telecom Engineers and Technical Staff involved in development, testing, and deployment requiring comprehensive details of SS7 Network Architecture, procedures & operations. Although this course requires no previous knowledge or understanding of SS7, a basic understanding of telecommunication network and OSI models would be beneficial.

| **Required Materials:** Recommended Learning Resources. | **Supplementary Materials:** Lecture notes and tutor extra reading recommendations. |
|---|---|

**Special Requirements:** The course requires a combination of lectures, demonstrations, discussions, and hands-on labs.

| Intended Learning Outcomes: | Assessment Criteria: |
|---|---|
| 1. Describe a set of telephony signaling protocols which are used to set up most of the world's public switched telephone network telephone calls. | 1.1 Define signalling<br>1.2 Outline the history of signalling and PSTN<br>1.3 Define Channel Associated Signalling (CAS)<br>1.4 Define Common Channel Signalling (CCS)<br>1.5 Outline the International Telephony Standards<br>1.6 Identify the services provided SS7/C7<br>1.7 Analyse SS7/C7 Signalling architecture<br>1.8 Outline SS7/C7 protocol stack<br>1.9 Identify how PSTN works and the relations to SS7/C7 |
| 2. Describes the components of the SS7 protocol stack and the hardware and software functions of the SS7 protocol divisional functional abstractions . | 2.1 Outline the Layer 2 protocol Message Transfer Part 2 (MTP2)<br>2.2 Identify the functions of MTP2<br>2.3 Outline the Layer 3 protocol Message Transfer Part 3 (MTP3)<br>2.4 Analyse the functions of MTP3<br>2.5 Outline the Layer 4 protocol Broadband/ISDN User Part (BISUP)<br>2.6 Describe the functions of Broadband ISDN User Part<br>2.7 Outline Signalling Connection Control Part (SCCP)<br>2.8 Outline the components of Transaction Capabilities Application Part (TCAP)<br>2.9 Describe TCAP functions |
| 3. Demonstrate principles, methodologies of service-oriented architecture, what it is, and how it affects what architects, CIOs, project managers, business analysts. | 3.1 Define intelligent networking<br>3.2 Explore how intelligent networks operates<br>3.3 Outline the Global System for Mobile (GSM) communication<br>3.4 Analyse GSM phases<br>3.5 Define Mobile Application Part (MAP)<br>3.6 Outline MAP operations |
| 4. Demonstration how Service providers can cut costs with SS7oIP and describe how SS7 Over IP enables wireless service providers to rapidly deploy emerging IP-based services for the mobile Internet that freely interact with the legacy mobile infrastructure. | 4.1 Outline the Next Generation Networks (NGN)<br>4.2 Describe the NGN architecture<br>4.3 Define Signalling Transport protocols<br>4.4 Describe the Signalling Gateway<br>4.5 Define Transport Adaption Layer Interface (TALI) |

## Recommended Learning Resources: Telephone Signalling System Technology

| | |
|---|---|
| **Text Books** | • Signaling System No. 7 (SS7/C7): Protocol, Architecture, and Services - A complete, practical guide to the world's most popular signaling system, including SIGTRAN, GSM-MAP, and Intelligent Networks by Lee Dryburgh and Jeff Hewett. ISBN-10: 1587050404<br>• Signaling in Telecommunication Networks by John G. van Bosse and Fabrizio U. Devetak. ISBN-10: 0471662887<br>• Voice over IP in Wireless Heterogeneous Networks: Signaling, Mobility and Security: Signaling, Mobility, Security by Hanane Fathi, Shyam S. Chakraborty and Ramjee Prasad. ISBN-10: 1402066309 |
| **Study Manuals**  | BCE produced study packs |
| **CD ROM**  | Power-point slides |
| **Software**  | None |