

## SS7 over IP (SIGTRAN)

“SS7 over IP (SIGTRAN)” course gives a detailed description of the structure and functions of the SIGTRAN that can be used to carry SS7 messages over the IP connection. During the course all SIGTRAN protocols are discussed. However the stress is put on two of them: SCTP and M3UA, as the first is mandatory for any SIGTRAN system and the second is chosen by major GSM/UMTS equipment vendors to be implemented in their products.

### Target audience

The course is intended for network engineers and anyone who needs technical knowledge on functionality of SIGTRAN and possibilities of SS7 messages transmission over IP network.

### Training contents

- **Introduction**

(IP networks, Signalling System No.7, GSM/UMTS Core Network, VoIP, IMS),

- Stream Control Transmission Protocol – SCTP
- SCTP introduction  
(the need for the new transport protocol, design process of the new transport protocol),
- SCTP packets  
(common header, interaction between SCTP and ICMP and ICMPv6, MTU discovery, ICMP messages and attacks to SCTP),
- Chunk structure  
(chunk type, chunk flags, chunk length, fixed fields, parameters, error cause, padding),
- Chunk types  
(INIT, INIT ACK, COOKIE ECHO, COOKIE ACK, DATA, SACK, HEARTBEAT, HEARTBEAT ACK, ABORT, SHUTDOWN, SHUTDOWN ACK, SHUTDOWN COMPLETE, ERROR),
- Association establishment  
(the evolution of the association establishment, comparison of the TCP and SCTP association establishment, cookie mechanism, SCTP and DoS attacks, SCTP and NAT interaction, parameters – addresses, streams and flow/buffer control),
- Transmission of data  
(basic data transmission – TSN, cumulative TSN, gap acknowledge blocks, selective retransmissions, flow control – congestion in the network, congestion in the receiver buffer, slow start, fast retransmission),
- Stream concept  
(streams as a solution to a HOL problem, mapping of upper layer data to streams, new sequential numbers – SSN).
- Errors
- Shutdown and abort procedures

- **SCTP exercise**

(analysis of the printout from protocol analyser),

- **SCTP Adaptation Layers**

(IUA, V5UA, M2UA, M2PA, M3UA, SUA),

- **MTP3 User Adaptation Layer - M3UA**

- Introduction  
(M3UA network architecture – AS, ASP, IPSP, SG, SGP, ASP states, ASP traffic modes, AS redundancy),

- Services provided by the M3UA layer  
(transport of MTP3 user data, native management functions, Interworking with MTP3 network management, SCTP stream mapping),
- Protocol stack  
(ISUP message transport, SCCP transport between IPSPs, SCCP layer in SG, examples of the messages transfer paths via SG),
- Routing  
(SPC representation, routing contexts and routing keys, message distribution at the SGP, message distribution at the ASP),
- Protocol elements  
(common message header, variable length parameter, common parameters, M3UA specific parameters),
- Transfer messages  
(DATA),
- SS7 Signalling Network Management Messages SSNM  
(DUNA, DRST, DAVA, DAUD, SCON, DUPU),
- ASP State Maintenance Messages ASPSM  
(ASPUP, ASPUP ACK, ASPDN, ASPDN ACK, BEAT, BEAT ACK),
- Routing Key Management Messages RKM  
(REG REQ, REG RSP, DEREG REQ, DEREG RSP),
- ASP Traffic Maintenance Messages ASPTM  
(ASPAC, ASPAC ACK, ASPIA, ASPIA ACK),
- Management Messages MGMT  
(ERR, NTFY).
- **M3UA exercise**  
(analysis of the printout from protocol analyser),
- **SCCP User Adaptation Layer - SUA**  
(services provided by the SUA layer, protocol stack, routing and address translation, protocol elements, messages and procedures),
- **ISDN Q.921-User Adaptation Layer - IUA**  
(services provided by the IUA layer, protocol stack, protocol elements, messages and procedures).

## Prerequisites

The participants should have attended the following course "Signalling System No. 7 in GSM" or should have the equivalent knowledge.

## Training method

Instructor-led training and exercises.

## Duration

2 days

## Level

Advanced