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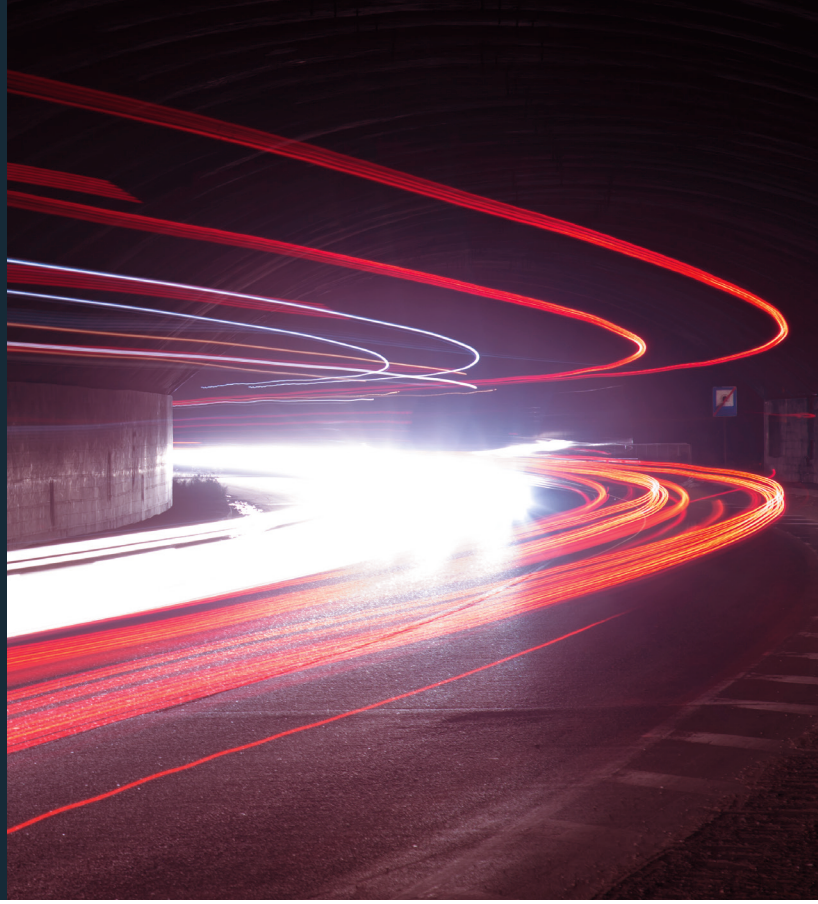
Innovating Telecoms Training



> Very good course. A lot to cover in 3 days. Thank you!

Watch our course intro video.

Analyzing the 2G and 3G Core Network

Course Description

This course is initially focused around the changes to the CS core network introduced in Release 4 of the 3GPP specifications, discussing the reasons for migration to packet transport. The main focus of the course is an exploration of the various protocols used to facilitate call establishment in the CS core. This includes showing how H.248/MGCP, SIP/BICC and RTP are all utilized in the call setup and subsequent voice exchange. The course also discusses the PS core, showing current operation based on GPRS, as well as next generation operation based on the EPC.

Prerequisites: GSM and GPRS System Engineering, UMTS System Engineering or equivalent knowledge.

3	18	
Days (LiveOnsite, LiveOnline)	**CPD Learning Credits**	**Level: 3 (Advanced)**

This course will contain the following sections:

1. Carrier Grade IP

Topic areas covered include:

- The Voice and Packet Core.
- Migration to a Packet Switched Transport Network - ARPU, OPEX, CAPEX.
- Motivation for the IP Soft Switch.
- Soft Switch Advantages and Disadvantages.
- Voice Core Protocol Placement:
  - BICC, Sigtran, SIP, H.248, MGCP, RTP/RTCP, MAP etc.
  - Overall Operation - High Level Call Flow.
- Packet Core Protocol Placement:
  - GTP User and Control Plane, MAP.
  - Overall Operation - Data Session Establishment.

2. Packet Transport Networks

Topic areas covered include:

- IP Transport Network Basics.
- MPLS and its Key Features:
  - Concepts of operation.
  - Traffic Engineering, Resiliency and Redundancy, Traffic Separation.
- Carrier Ethernet.

3. IP Signalling Aspects

Topic areas covered include:

- Sigtran Components:
  - SGW, STP, SCTP, User Adaptation.
- SCTP Architecture:
  - Associations, Endpoints, Streams, Chunks.
- SCTP Association Establishment:
  - INIT, INIT-ACK, COOKIE-ECHO, COOKIE-ACK.
- SCTP Data Transmission and Acknowledgement:
  - TSN, SSN, SID, SACK.
- User Adaptation Layers:
  - SUA, IUA, M3UA, M2UA, M2PA.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

4. Media Description

Topic areas covered include:

- SDP Composition:
  - Session and Media Level Parameters.
- SDP Transport Options:
  - SIP, H.248, BICC etc.
- Session Level Parameters.
- Media Level Parameters.

3
Days
(LiveOnsite, LiveOnline)

18
CPD Learning Credits

LiveOnsite, LiveOnline

5. IP Traffic Aspects

Topic areas covered include:

- RTP and RTCP Overview.
- RTP Key Functionality:
  - RTP Header Fields.
- RTP and Voice Codecs.
- Compression.
- RTCP Reports and their Key Components - Sender, Receiver, SDES, Bye, App.

6. Quality of Service Issues

Topic areas covered include:

- Problems in IP Networks for QoS:
  - Jitter, dropped packets, delay, mis-sequencing etc.
- QoS Mechanisms for IP:
  - IntServ and RSVP.
  - DiffServ.
- Additional QoS Mechanisms for Packet Networks:
  - 802.1p, MPLS-TE, BFD, SBCs etc.

7. Media Gateway Control Protocols

Topic areas covered include:

- H.248 Protocol Architecture - Capabilities and Features.
- H.248 Transactions - Contexts, Terminations, Commands, Descriptors.
- H.248 Packages - Specific packages employed in the 3GPP Release 5 architecture.
- Message Flow for Call Establishment and Termination.
- MGCP Architecture - Differences between H.248 and MGCP.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

8. Bearer Independent Call Control

Topic areas covered include:

- BICC CS1 and CS2.
- BICC CS2 Key Functions:
  - CSF, BCF, MCF etc.
- ISUP Message Format.
- IPBCP.
- BICC Call Establishment.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

9. Session Initiation Protocol

Topic areas covered include:

- SIP Capabilities.
- SIP Identities and Functional Elements:
  - AoR, Proxy, Registrar, Redirect.
- Methods:
  - Register, Invite, Ack, Cancel, Bye, Options.
- SIP Registration and Registration Security.
- SIP Session Establishment.
- Development of SIP:
  - SIP Working Groups, SIMPLE, SIPPING.
- Areas of Development:
  - Header Fields, Methods, Warning Codes, Security Mechanisms.
- Additional Methods:
  - Publish, Subscribe, Notify, Prack, Info, Update, Message, Refer.
- Problems associated with Firewalls and NAT.
- NAT Traversal Techniques:
  - UPnP, ICE, SBC.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

10. End to End Call Procedures

Topic areas covered include:

- Protocol Interoperation during Call Establishment.
- Interaction with the UTRAN - Key RANAP messages.
- Mobility Database Interrogation - Key MAP messages.
- Mobility and the Core Network.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

11. GPRS Packet Core Fundamentals

Topic areas covered include:

- PS Operation Concepts:
  - SGSN, GGSN, APN.
- GPRS Attach and Combined Attach.
- PDP Contexts:
  - Activation, Modification and Deactivation.
- Mobility Concepts.
- Secondary PDP Contexts:
  - Activation, TFT, Packet Filters.
- Mobility Database Interrogation - Key MAP messages.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

12. Future Core Networks

Topic areas covered include:

- Requirements and Market Drivers for the EPC and 5GC.
- VoLTE, VoNR and the IMS.
- 3GPP Standards Process.
- LTE and 5G NR Principles of Operation.

Activity: analysis of real network traces using Mpirical's NetX analysis tool.

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