V1.510

Course Sequence: IP for Telecom Professionals

Module 1: **"Quo vadis"** / Module 2: The Basics / Module 3: Advanced Issues

Course Duration:

1 day

Course Description:

- This course addresses the needs of everybody who needs to understand how and why the telecommunication world is merging with the IP-world.
- One key issue is to understand what "Next Generation Networks" are all about.
- We will present the ideas and the concept of the IMS (IP Multimedia Subsystem) and the related hardware, software and protocols like soft switches (media gateways), SIP, SDP, H.248, ENUM or SIGTRAN.
- The previous topic will allow us the understanding of Triple-Play Services. It will be obvious that only an IP-bearer network will allow the telecom and mobile operators to sustain against new competitors like ISP's and cable-TV operators.
- The course includes the presentation of some basic multimedia scenarios like video call establishment through SIP and SDP.
- The course concludes with the presentation of IP-centric mobile communication systems like WIMAX, Flash-OFDM or IEEE 802.20.

Pre-Requisites:

- The student should possess at the least basic technical understanding of today's wireline and/or wireless communication technologies.
- Basic knowledge of the TCP/IP-protocol suite and its environment is desirable.

Course Target:

- The student will understand the driving forces behind the migration towards an all IP-network.
- The student will be aware of the technical options and features to achieve such an all IP-network in telecommunication.

Table of Contents:

⇒ Tasks and Functions of the S-CSCF
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⇒ Tasks and Functions of MRFC and MRFP
⇒ Tasks and Functions of BGCF and MGCF
⇒ Soft Switches and their Controllers
⇒ Media Gateways and Soft-Switches

Relationship between SIP, the IMS and 3GPP-Networks

And where are SIP, SDP and all the other Protocols used?
⇒ Why SIP is used and not H.323 or other alternatives?

Simple Example of a SIP-Scenario: VoIP Call Setup with SIP
⇒ Overview
⇒ Request: INVITE-Message
⇒ Response: 100 (Trying)
⇒ Response: 180 (Ringing)
⇒ Response: 200 (OK)
⇒ Request: ACK
⇒ Request: BYE
⇒ Response: 200 (OK)
⇒ The Related Session Description Protocol (SDP) Contents
⇒ Structure of SDP-Parameters within a SIP-Message
⇒ The Mobile's Way to SIP Registration and SIP-Sessions

Registration to the IMS in 3GPP-Networks
⇒ Subscriber registers in H-PLMN
⇒ Subscriber is Roaming
⇒ The Related Scenario
⇒ Call towards the PSTN
⇒ Call from the PSTN

The H.248- / MEGACO-Protocol
⇒ Introduction
⇒ Principles of Media Gateway Operation
⇒ Contexts and Terminations
Terminations
Contexts

What is SIGTRAN?

And what is ENUM?

The Need for QoS in IP Networks

QoS Options in IP-Networks
⇒ Operation of Integrated Services

⇒ Operation of Differentiated Services
Per-Hop forwarding Behavior (PHB)
⇒ DiffServ ⇔ IntServ
⇒ Operation of MPLS
Routing Labels
Label Distribution

IP-centric 3G+ and 4G Mobile Communication Networks

Wireless Technologies

WLAN Overview

WLAN Architecture

⇒ How does a Station join a WLAN?
⇒ WLAN Channel Access Principles
CSMA / CA
Without Reservation (RTS / CTS)
RTS / CTS mechanism
Point Coordination Access (PCF)

FLASH-OFDM Overview

What is WIMAX?

The Different Members of the WIMAX-Family

⇒ WIMAX as Backhaul Link ⇔ The Genuine IEEE 802.16-2001 standard
⇒ WIMAX for Fixed Broadband Access ⇔ IEEE 802.16a, d / IEEE 802.16-2004
⇒ WIMAX for Nomadic Users ⇔ IEEE 802.16a, d / IEEE 802.16-2004
⇒ WIMAX for Mobile Users ⇔ IEEE 802.16e / IEEE 802.16-2005
Example Configuration
⇒ WIMAX in the Backhaul ⇔ The Genuine IEEE 802.16-2001 standard (10 – 66 GHz / LOS)
⇒ WIMAX for Fixed Broadband Access and Nomadic Users ⇔ IEEE 802.16a / IEEE 802.16-2004
⇒ WIMAX as Cellular Technology ⇔ IEEE 802.16e

The Business Case of IEEE 802.16

⇒ Question 1: Which markets does IEEE 802.16 attack?
⇒ Question 2: What makes WIMAX / 802.16 appealing for the Cellular Market?
⇒ Question 3: Who are the players on the WIMAX-markets?

Seamless Mobility – the Meaning of IEEE 802.21

Conclusions and the Look Ahead
The IEEE 802.16 Network Architecture
⇒ Initial Considerations:
Option A: Static Peers (with ATM as User Protocol)

Technology Overview
⇒ Overview of the Protocol Stack

Network Operation and Registration in IEEE 802.16
⇒ Frequency Scan and PHY-Synchronization
⇒ Listen to Broadcast Messages
⇒ Initial Ranging
⇒ Negotiate Basic Capabilities
⇒ SS-Authentication, Authorization and Key Exchange
⇒ Registration
⇒ Obtain IP-Address
⇒ Obtain “Time of Day”
⇒ Receive additional SS-configuration data
⇒ Establish pre-provisioned connections

List of Acronyms