

Hands-on course , 4  
day(s)  
Ref : VON

### Participants

This seminar is aimed at technicians, engineers and network architects interested in the identification of challenges and successes for the implementation of voice over IP technologies.

### Pre-requisites

The participant should have basic understanding of TCP/IP or telephony.

### Next sessions

# Voice Over IP, Technologies and Applications

## OBJECTIVES

*Voice over IP has been proven to reduce telephony costs and provide unique opportunities for integrating voice and data. By completing this course participants will learn how to implement Voice over IP (VOIP) quality of service and how to use it for new applications.*

### 1) Introduction and technology

#### 2) Protocols and data network technologies: the basics

#### 3) H.323 architecture

#### 4) SIP architecture

### 5) MGCP/MEGACO/H.248 architecture

#### 6) Voice quality

#### 7) Packet networks: quality

## 1) Introduction and technology

### Market analysis

- Data networks cost allocation.
- Telephony networks cost allocation.
- Marketplace, latest trends and developments.
- TOIP/VOIP major players.
- Business triggers.

### Key points

- Why VOIP (challenges, strategies, benefits, constraints...).
- Factors and motivations.
- Today's network components.
- Tomorrow's network trends.
- Organization factors.

### Data networks versus voice networks

- Typical telephony network technology (architecture/functionalities...).
- Data network technologies (architecture/functionalities...).
- Benefits and constraints of today's solutions.

### Positioning of VOIP/TOIP technologies

- Philosophies of major players.

## 2) Protocols and data network technologies: the basics

- Introduction to OSI, Ethernet, LAN, WAN.

### IP protocol essentials

- Operating mode, addresses, class, subnet, header content.
- IPV6.

### Router operating mode and routing process

- Routing table/switching.
- Ports/sockets.

### Introduction to VOIP/TOIP layers

- UDP protocol role.
- Real time RTP/RTCP protocol.

## 3) H.323 architecture

### Typical telephony signaling

- Telephone call steps.
- Sequences.
- Signaling.

### Introduction to H.323

- Protocol stack: definition and presentation.
- Components (Gatekeeper, Gateway, End point, MCU...).
- H.323 signaling: with and without Gatekeeper.
- H.225 and H.245 protocols: definition and presentation.

## 4) SIP architecture

- SIP protocol history.
- Components (proxy server, redirect server, registrar server...).
- SIP architectures and associated message flows.
- SIP server roles.

#### Introduction to SIP

- Primitives, commands.
- SIP versus H.323.

### 5) MGCP/MEGACO/H.248 architecture

- MGCP protocol history.
- Components (MG, Access GW, MCU...).
- H.248 architectures and associated message flows.

#### Introduction to H.248

- Primitive, commands.

### 6) Voice quality

#### Introduction to voice

- Operating mode, characteristics, constraints...
- Voice quality, how to measure it?
- Digitization of voice.
- Carrying voice over a packet network: constraints and challenges.

#### Voice quality management: tools

- Signal coding.
- Codecs (PCM, CELP, ADPCM...).
- Bandwidth.
- Compression.
- Echo cancellation.

### 7) Packet networks: quality

- IP quality of service: definition.
- Why is quality of service needed?

#### Quality of service models

- Diffserv, Intserv, COS / IP Precedence, 802.1Q/P.
- QoS within an Ethernet frame.
- QoS within an IP packet.

#### QoS within a data network

- Delay and jitter.
- Measuring transmission time (packetization, bufferization, serialization, coding...).
- Silence detection.
- Fragmentation.
- Conception of a voice over an IP network.