

## Course Outline

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**Course Title:** T9102-Understanding Voice Over IP, VOIP  
**Course Duration:** 3 Days Classroom without labs  
5 Days Classroom with hands on labs  
3 Days Webinar

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### Section 1

Welcome, Introductions, House rules, course agenda.

### Section 2

The market for VOIP

- Cost savings
- Risks of convergence
- IP the convergence technology the markets demand
- Meeting the VOIP challenge
- VOIP standards and RFC's
- It doesn't stop at voice...Full multimedia delivery, anywhere any how.

### Section 3

Voice basics

- POTS basics
- Signalling systems
- POTS quality Measurement
  - Voice quality
  - Erlang theory
- Migrating POTS to VOIP

### Section 4

#### Concepts of voice CODEC's

- Simple PCM and G.711
- Why use compression
- Compression techniques
  - ADPCM
  - CELP
  - G.723.1
  - G.729/729A
- QOS and QOS for VOIP
  - Voice degradation due to jitter
  - Voice degradation due to delay
  - Compensating at Layer 2 IPoA, FRF-x, Ethernet tagging.
  - Compensating at Layer 4 RTP/RTCP, cRTP
- Measuring the quality of VOIP
  - MOS
- Video CODEC's
- Why MPLS makes VOIP commercially viable
  - QOS options for VOIP over MPLS and IPv6

#### LAB Using, and monitoring Simple VOIP

### Section 5

#### H.323 Signalling

- The H.323 standard
- The components of a simple VOIP PBX network
- The need for signalling
- Q.931 signalling
- Adapting Q.931 for VOIP (H.225/H.245)
- VOIP Gateways
- VOIP breakout
- VOIP Gatekeepers
- "Hair pinning"
- H.248 Megaco

### LAB Monitoring and testing H.225/H.245 signalling

- Session Initiation Protocol, SIP
- SIP concepts and features
- SIP architecture
- SIP operation

### LAB Monitoring and testing SIP

#### Section 6

VOIP capacity issues.

- POTS Traffic theory
- Erlang calculation
- Sizing VOIP virtual trunks for Inter PBX working

#### Section 7

IMS

The promise “Any content delivered to any type of device, anywhere.”

The technology to deliver the full promise of convergence has taken longer than the market anticipated, now the race is on. Hot on the heels of, and developed from SIP, is IP Multimedia Subsystem, IMS. Developed from within the IP community, IMS is seen by many as the clear front runner. This section gives an overview of IMS capabilities, and enabling requirements.

- IMS goals and objectives
- IMS, building on SIP
- IMS and IPv6
- IMS architecture
- IMS Operation

#### Section 8

What is out there?

This section takes a look at the VOIP offerings of some of the major vendors.

**Exam**

**Course wrap up**