

Audio over IP for engineers

A 3 day **Hands on** training course



Description

Explore the world of Audio over IP with this hands-on, comprehensive course designed for engineers with a solid knowledge of TCP/IP. Explore a wide range of architectures, standards, and delivery methods rather than focusing on one standard. The course covers all critical areas of AoIP, including RTP, multicasting, Dante, AES67, and low-latency streaming. Hands-on sessions provide practical experience with these technologies, allowing delegates to apply their knowledge directly. Through interactive activities and in-depth analysis, you will gain the expertise needed to navigate and implement AoIP systems effectively.



Key outcomes

By the end of the course delegates will be able to:

- ✓ Recognise the use of various protocols and techniques used in AoIP.
- ✓ Use Wireshark to analyse and troubleshoot audio streams.
- ✓ Troubleshoot and test multicast networks.
- ✓ Evaluate AoIP technologies.
- ✓ Compare and contrast Dante, AES67, Ravenna and other AoIP protocols.



Training approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning. Hands on sessions are used throughout to allow delegates to consolidate their new skills.



Details

Who will benefit?

Technical staff working with Audio over IP.

Prerequisites

TCP/IP foundation for engineers.

Duration: 3 days

Customer rating:

New course

Generic training



Generic training complements product specific courses covering the complete picture of all relevant devices including the protocols "on the wire".

"Friendly environment with expert teaching that teaches the why before the how."
G.C. Fasthosts

Small class sizes



We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.

"Excellent course. The small class size was a great benefit..."
M.B. IBM

Hands On training



The majority of our courses use hands on sessions to reinforce the theory.

"Not many courses have practice added to it. Normally just the theoretical stuff is covered."
J.W. Vodafone

Our courseware



We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.

"Comprehensive materials that made the course easy to follow and will be used as a reference point."
V.B. Rockwell Collins

Customise your course



Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.

"I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on."
S.R. Qinetiq

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Course content

What is AoIP?

What is IP? What is Audio? AoIP use cases. Codecs: PCM, compression, MP3, AAC, uncompressed PCM, sample rates, bit depth. The major AoIP protocols: Dante, AES67, Ravenna, Livewire+, Wheatnet.

Hands on: Base IP connectivity, Sending an audio stream using audacity and Ravenna VSC.

AoIP protocol stacks

Ethernet, Layer 2 audio protocols: Livewire, Wheatnet. IP, TCP, UDP, RTP. IPv6. Why UDP is used. Dante, AES67 and Ravenna. Using SMPTE 2110 for audio.

Hands on: AoIP packet analysis with Wireshark.

IP issues

Is bandwidth an issue with Audio? Factors affecting bandwidth: Quality and sample rate, number of channels. Delay, latency, jitter, signalling. Routers. QoS, IP DSCP field, 802.1Q.

Hands on: Analysing jitter, packet loss and other performance issues. Iperf3.

RTP

RTP, ports, payload types, dynamic payloads, RTCP.

Hands on: RTP analysis with Wireshark.

Security

VLANs, Firewalls, VPNs. SRTP. Dante and AES encryption.

Hands on: Securing an AoIP channel.

Timing

Synchronisation in one stream versus many streams. What is time? Computers and time. NTP, PTP, how PTP works, transparent and boundary clocks. PTP timestamps. Synchronising RTP timestamps.

Hands on: Analysing PTP with Wireshark.

Multicasting

Multicasting compared to unicasting and broadcasting, when to use and when not to use multicasting. Multicast addressing.

Hands on: Multicast troubleshooting tools.

Multicast architecture

The big picture, IGMPv1/v2/v3, PIM-SM, SSM. MLD. SAP/SDP.

Hands on: IGMP snooping, Building and analysing a routed multicast network.

Multi zone audio distribution

Multiple zones with different audio streams. Failover and redundancy. STP, RSTP.

Hands on: Audio routing and automatic failover.

AoIP protocols and architectures

Comparison of Dante, AES67, SMPTE 2110 30 and 31, Ravenna, Livewire+ and Wheatstone. Interoperability. When and where each is used. AoIP hardware and software overview. IP audio edge, Interfaces, consoles, DSPs. Virtual soundcards and software mixers.

Hands on: Dante controller flow monitoring of AES67 streams.

