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Course ID	Course Title
SIPWS	**Session Initiation Protocol (SIP) Workshop**

Course Duration
2-3 days

Related Courses

- SIP Security: A Comprehensive Short Course (SIPSEC, 2 days)
- IP Security v2 (IPSec v2) Architecture and Protocols (IPSEC, 2-3 days)
- IP Security v3 (IPSec v3) Workshop (IPSECWS, 2-3 days)
- VoIP: Protocols, Design, and Implementation (VOIP, 2-3 days)
- State-of-the-art of VoIP Technology for Professionals, Managers, and Executives (VOIP-EXEC, 1 day)
- VoIP Security (VOIPSEC, 2 days)
- Principles of Network Security: CompTIA Security+ and US DoD Directive 8570.1 (NETSEC, 3-4 days)
- IMS: The Technology, Applications, and Challenges (IMS, 2 days)
- 3G, IMS, and the Carrier Business Economics (3G-IMS-STRAT, 2 days)
- Multimedia Applications: IMS, SIP, and VoIP (MULTIMEDIA, 2 days)
- Internetworking with TCP/IP Version 6 (IPV6, 2-3 days)
- IP-Based Systems: TCP/IP and Mobile IP (IPSYS, 2-3 days)
- MPLS: Integrated Routing with End-to-End QoS for the Next Generation Networks (MPLS, 2-3 days)
- Unified Communications in Public Safety, Law enforcement, and Homeland Security (UNIFIED, 2-3 days)
- Traffic Engineering Models for Network Design (TRAFFIC, 3 days)

Aimed At

If you are a communications, systems, or software engineer; data network, telephony, IT, or marketing/sales professional; or technical or strategy manager or consultant who needs a detailed, hands-on understanding of SIP, this course is for you.

Group Size

5-25

Prerequisites

- SIP Protocol, Architecture, and Design (SIP, 1 day)

The above course, or equivalent knowledge/experience, is a recommended prerequisite.

Course in a Nutshell	This workshop offers a deep dive into the intricacies of the Session Initiation Protocol (SIP) and related protocols. While basic protocol operation is covered, the emphasis is on problem isolation and trouble shooting of problems that are often encountered while implementing SIP and the associated SIP trunking protocol, SIP-T. The course is predominantly hands-on, with the structured or independent discovery labs accounting for over two thirds of the class time.

Customize It!	We can adapt this course to your group's background and project requirements at little to no added charge. Depending on your needs, the course can be tailored to emphasize certain topics, include more or fewer labs, or made more or less technical.

Learn How To

- Understand the internal protocol operations of SIP and SIP-T
- Describe and troubleshoot call set up, media transport, and call tear down for SIP and SIP-T
- Analyze and troubleshoot call traces of phone connectivity problems in a SIP environment
- Detect call connection problems and suggest solutions from SIP call traces in a small enterprise or carrier IP telephony example
- Determine source of echo, troubleshoot echo cancellation issues, and consider the contribution of electrical vs acoustic echo to call degradation
- Perform root cause analysis on SIP call traces for two of the most pervasive problems in VoIP: broken speech and dropped calls
- View and dissect Quality of Service (QoS) and Quality of [User] Experience (QoE) issues on SIP and SIP-T call traces, understand differences in MOS and R-Values and calculations relative to different call types, and listen to media samples of impairments

Course Outline

- Course Intro: Lecture

  ° Overview
  ° ClearSight Analyzer
  ° Logistics and Labs

- SIP Overview: Lecture

  ° SIP Servers
    ▪ Proxy Servers
    ▪ Redirect Servers
    ▪ Location and Directory Servers
    ▪ Registration
    ▪ Locating SIP Servers
  ° SIP Messages and Procedures
    ▪ Message Structure
    ▪ Requests and Responses

- ▪ Addressing
- ▪ Completion/Error Codes
- ◦ Basic Call Flows and Service Examples
  - ▪ Media Streams/Packets in SIP Sessions
  - ▪ RTP/RTCP
  - ▪ Media Coding
  - ▪ Session Description Protocol (SDP)

- SIP Workshop Lab
  - ◦ Call Set-Up
    - ▪ Invite
    - ▪ SDP
  - ◦ Media Streams/Packets
    - ▪ RTP/RTCP
    - ▪ Media Coding
    - ▪ Content Monitoring
  - ◦ Call Tear-Down

- SIP-T Overview: Lecture
  - ◦ Telephony Trunking Overview
  - ◦ TDM vs Packet Voice
  - ◦ SIP-T Messages and Procedures
    - ▪ Message Structure
    - ▪ Requests and Responses
    - ▪ Addressing
    - ▪ Completion/Error Codes
  - ◦ Basic Call Flows and Service Examples
    - ▪ Media Streams/Packets
    - ▪ Error Conditions

- Skinny Workshop Lab
  - ◦ Call Set-Up
  - ◦ Media Streams/Packets
    - ▪ RTP/RTCP
    - ▪ Media Coding
    - ▪ Content Monitoring
  - ◦ Call Tear-Down

- Top 5 VoIP Problems LABs
  - ◦ Phone Connectivity: Lab
  - ◦ Analyze and Troubleshoot Call Traces of Phone Connectivity Problems

in a SIP Environment.

- ° LAB Debrief: Group Discussion

- Call Connection Lab

    - ° Detect Call Connection Problems and Suggest Solutions from SIP Call Traces in a Small Enterprise or Carrier IP Telephony Example
    - ° LAB Debrief: Group Discussion

- Call Echo Lab

    - ° Determine Source of Echo, Troubleshoot Echo Cancellation Issues and Consider the Contribution of Electrical vs Acoustic Echo to Call Degradation
    - ° LAB Debrief: Group Discussion
    - ° Broken Speech/Dropped Calls
    - ° Perform Root Cause Analysis on SIP Call Traces for Two of the Most Pervasive Problems in VoIP
    - ° LAB Debrief: Group Discussion

- Voice Quality/QoS/QoE Lab

    - ° View and Dissect Quality of Service (QoS) and Quality of [User] Experience (QoE) Issues on SIP Call Traces, Understand Differences in MOS and R-Values and Calculations Relative to Different Call Types, and Listen to Media Samples of Impairments
    - ° LAB Debrief: Group Discussion

- Course Recap, Q/A, and Evaluations

How You Will Learn

- A SIP/Unified Communications subject matter expert who is also a highly skilled lecturer/lab facilitator will conduct this course in workshop format.
- The instructor will employ a combination of short lecture, labs, and group debriefs between labs to help you understand and apply the SIP concepts and techniques taught in this course.
- If you already know something SIP, we will build on that. If your background is less technical, we will use examples and analogies to make the technical content of SIP easier to understand.
- We will provide you with a Participant Handbook that will help you recall and reference what you learned in class and apply it to your SIP needs back on your job.

Revised   *May 5, 2008f*