

Experience INACON Bootcamp

IMS Signaling Protocols (e.g. SIP, SDP, DIA)

INA CON

- Hands-On
- Close to Reality
- Small Audience
- Practical Learning



The screenshot displays a multi-pane interface for a network simulation. The top-left pane shows logs for the 'ims' component, including SIP messages like 'S[R_Open] hss.open-ims.inacon:3868 D[]' and 'INF:S-CSCF: Registrar Contents begin'. The top-right pane shows logs for the 'hss' component, including Diameter messages like 'Snd_DWA Diameter: Code=280 AppID=0 HbHID=1170691870 E2EID=-936861422'. The bottom-left pane shows logs for the 'pscsf' component, including SIP messages like 'INF:P-CSCF: Subscription list end' and 'S[R_Open] hss.open-ims.inacon:3868 D[]'. The bottom-right pane shows logs for the 'icscf' component, including SIP messages like 'S[R_Open] hss.open-ims.inacon:3868 D[]'. Overlaid on the bottom-right is a window titled 'OpenIC(Alice)' showing a 'Phonebook' with a contact 'B. Bob' and a status of 'registered'.

IMS Bootcamp

IMS Signaling Protocols (SIP, SDP, DIA)

Course Duration:

- ▶ 3 days

Course Description:

- ▶ This bootcamp is addressed to everybody who needs to understand the ideas and concepts of an IMS.
- ▶ The bootcamp is structured in different sessions with their own key topics. Each section consists of a theoretical part followed by a practical exercise.
- ▶ The bootcamp starts with a general introduction to the IMS and the Open IMS. This includes the used tools (e.g. Wireshark as trace analyzer) and the bootcamp workflow.
- ▶ The first registration-related practical exercise makes the student familiar with the tools and the behavior of the system as well as with the characteristics of the Open IMS.
- ▶ The next section covers SIP and SDP especially their protocol structure, tasks and functions. We conclude that section with a review of a call setup.
- ▶ The practical part deepens the use of SIP and SDP during the session establishment and shows the used message routing mechanisms within the IMS.
- ▶ This section provides the student the theoretical background to understand the call setup procedure with QoS negotiation between the peers by using the parameters *preconditions* and *100rel*.
- ▶ Within this practical exercise the students are forced to recall their knowledge about SIP and SDP.
- ▶ The last session relates to the important Application and Service domain. The students will refresh their knowledge about event server and the purpose of the SIP messages *PUBLISH*, *SUBSCRIBE* and *NOTIFY* and the signaling over the ISC interface towards the A&S domain.
- ▶ This practical exercise introduces to presence as a service offered by the A&S domain. Furthermore the students analyze a scenario related to an IP TV / VoD service.

Course Target:

After this bootcamp the student...

- ▶ is able to analyze protocol traces taken within the IMS test-system
- ▶ has the ability to nail down errors and bugs within an IMS
- ▶ has the ability to identify the problem sources
- ▶ understands the message flow inside the IMS
- ▶ understands the interworking with the common IP-Components (DNS, DHCP)



Pre-Requisites:

- ▶ This course requires participants to have a very good knowledge of SIP, IMS and IP.
- ▶ We advise to visit our classes “SIP, SDP and other NGN Protocols -Signaling & Protocol Analysis” and “IMS-Architecture Details & System Engineering” before.

Who should attend this bootcamp?

- ▶ Technicians and Engineers who need the ability to nail down errors within the IMS
- ▶ Technicians and Engineers who like to be enabled as practical field staff

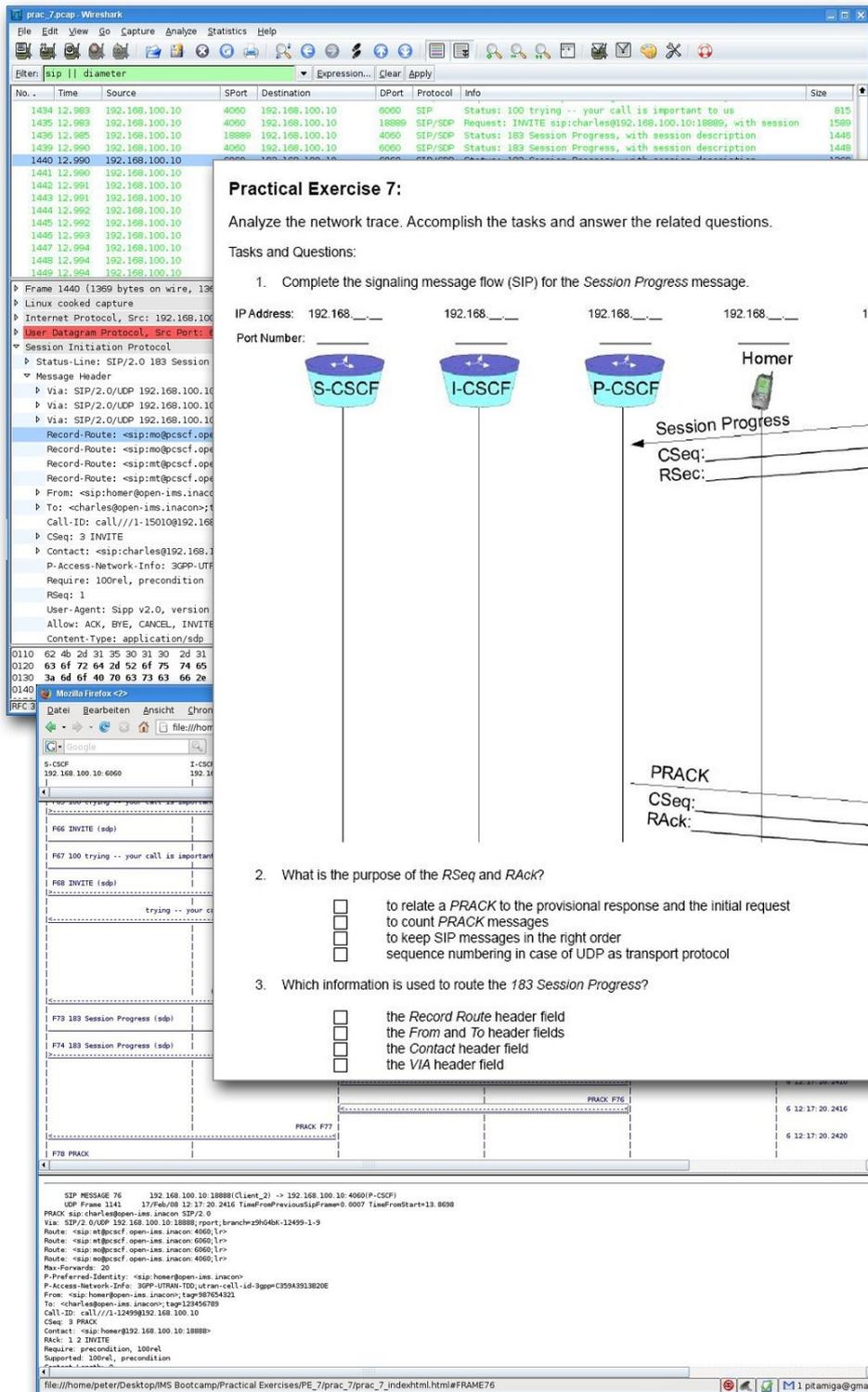
Related Courses:

- ▶ IMS-Architecture Details & System Engineering
- ▶ SIP, SDP and other NGN Protocols - Signaling & Protocol Analysis

Necessary Equipment:

- ▶ Laptop/PC to take and analyze traces

Example of a Practical Exercise and used Tools:



The image shows a Wireshark capture of SIP messages. The main pane displays a list of captured packets, with packet 1440 selected. The packet details pane shows the structure of the SIP message, including the Message Header, Record-Route, From, To, Call-ID, CSeq, Contact, P-Access-Network-Info, Require, RSeq, User-Agent, Allow, Content-Type, and P-Body. The P-Body contains the Session Progress message body.

Practical Exercise 7:

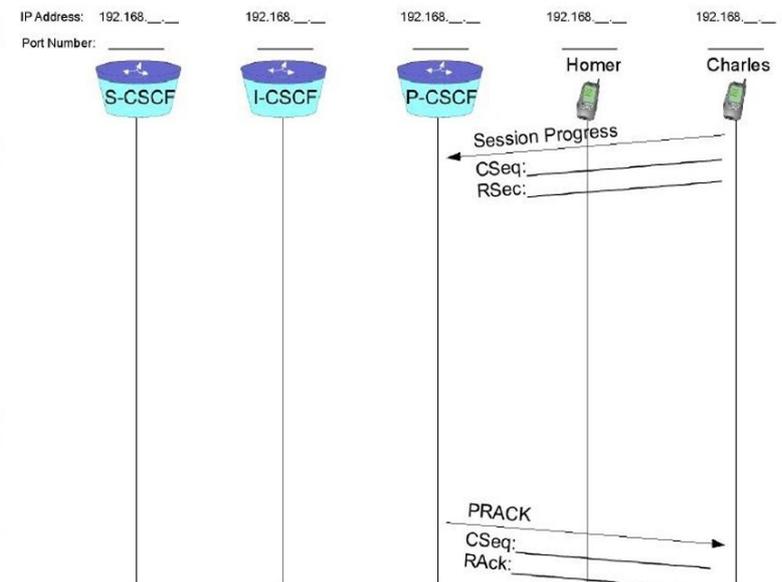
Analyze the network trace. Accomplish the tasks and answer the related questions.

Tasks and Questions:

- Complete the signaling message flow (SIP) for the *Session Progress* message.

IP Address: 192.168.____ 192.168.____ 192.168.____ 192.168.____ 192.168.____

Port Number: _____



The diagram shows a signaling message flow between five entities: S-CSCF, I-CSCF, P-CSCF, Homer, and Charles. Homer and Charles are represented by mobile phone icons. The flow starts with a 'Session Progress' message from Homer to Charles. The message contains 'CSeq:' and 'RSeq:' fields. Below this, a 'PRACK' message is shown being sent from Charles back to Homer, containing 'CSeq:' and 'RAck:' fields.

- What is the purpose of the *RSeq* and *RAck*?
 - to relate a *PRACK* to the provisional response and the initial request
 - to count *PRACK* messages
 - to keep SIP messages in the right order
 - sequence numbering in case of UDP as transport protocol
- Which information is used to route the *183 Session Progress*?
 - the *Record Route* header field
 - the *From* and *To* header fields
 - the *Contact* header field
 - the *VIA* header field

Table of Contents:

Theory 1: Network Architecture

- ▶ General IMS Network Architecture
- ▶ Course-specific Network Structure
- ▶ Involvement of the IMS assemblies within the Registration Procedure
- ▶ Introduction to wireshark as tracetool
- ▶ 3GPP related Registration

Practice 1: Registration related Exercises

- ▶ Determination of the general SIP Signaling Message Flow
- ▶ Study of the tasks and functions of the Call Session Control Functions
- ▶ Analysis of the interworking with the HSS
- ▶ Analysis of Diameter Messages at the Cx Interface
- ▶ User Identities and their use
- ▶ Considerations of the impact of roaming

Theory 2: Call Setup

- ▶ SIP Methods and their functions
- ▶ Use of SDP within the Session
- ▶ Basic Call Setup Procedure

Practice 2: Call Setup and Call Modification studies

- ▶ Analysis of the System behavior during Call Setup
- ▶ Introduction of Routing Mechanisms
- ▶ Call Modification Scenario analysis
- ▶ Analysis of Message related Scenarios



Theory 3: SDP and SIP Interworking

- ▶ Introduction of SIP Methods PRACK and UPDATE and the SDP parameter for preconditions
- ▶ Considerations about Call Setup Scenarios with QoS Negotiating

Practice 3: Extended Call Setup

- ▶ Analysis of a Call Setup with QoS Negotiating
- ▶ Considerations about required and supported features

Theory 4: Application Server within the IMS

- ▶ Use of different AS
- ▶ Methods SUBSCRIBE, PUBLISH and NOTIFY
- ▶ Communication over the ISC Interface
- ▶ HSS involvement and Routing decisions based on Trigger Points

Practice 4: Accessibility of AS over the ISC Interface

- ▶ Analysis of the signaling towards a Presence Server
- ▶ Considerations about the Tasks and Functions of the X-CSCFs, HSS and the UA
- ▶ Examination of the delivery of Presence related information using SIP
- ▶ Signaling analysis towards an IP TV / VoD AS