S-38.3115 Signaling Protocols, Signaling Exercise, 2006, Period III

Deadline: Fri. 3.3.2006 at noon. *All late answers will be disregarded. Please adhere to the deadline.*

Return: The course mail box with the course code (S-38.3115 Signaling Protocols). The Networking Laboratory's mail boxes are situated in the G-wing on the second floor of the Electrical and Communications Engineering.

Remember to include your name and your student number *at the beginning of the document*. Answers to the exercise must be submitted in English or Finnish.

Task 1 – IMS Signaling:
Download 3GPP TS 24.228 V5.14.0 - Signaling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) - specification from 3GPP website: (http://www.3gpp.org/ftp/Specs/html-info/24-series.htm)

Get familiar with section 7 – Signaling flows for session initiation (non hiding) (Informative), especially with section 7.2.2.

a) – Signaling flow size (4p)
Calculate amount of SIP signaling traffic (in bytes) on mobile terminal's air interface for mobile originated call when roaming (i.e. the traffic between UE and P-CSCF). (**note:** Remember to fill up the parts of the messages that have been left blank/omitted in the 3GPP specification (in 3GPP specifications, lines that have been shown in past messages are usually left blank in subsequent messages if they have not changed)).

Calculate the size of each message individually. This is easiest to do by saving each message in separate text file. Also calculate the cumulative size for the signaling flow as more messages are sent. Graph this cumulative flow size against the number of sent messages. How many bytes the whole call setup signaling contains?

b) – Signaling speed (1p)
If we have a 64kbit/s signaling channel, how long it takes to send all call setup signaling through that channel? (Let us ignore the fact that some of the messages are sent from the mobile terminal to the fixed network [upstream] and others from the fixed network to the mobile node [downstream].)

c) – SigComp (1p)
If we use SigComp to compress signaling and achieve 1:4 compression ratio, how long it takes to send all messages through 64kbit/s signaling channel?

d) – Individually zipped messages (2p)
Save the messages in separate text files (you probably already did this in a)). Zip-compress these text files individually (e.g. using WinZip or gzip), and draw a graph how the size of the signaling flow cumulates if signaling messages are zipped before sending.

e) – Cumulatively zipped messages (2p)
Save the partial message flows in text files, so that the first file contains only the initial *INVITE* request (this you should already have); the second file contains the *INVITE* request, and the *100 Trying* provisional reply; the third file contains: *INVITE, 100 Trying, 183 Session Progress* messages *...;* So that the last text file contains the whole signaling flow.

Zip-compress text files individually (e.g. WinZip, gzip), and draw a graph how the size of zipped message flow cumulates as more messages are sent. (Remember to specify which program you used for zipping).

f) – Does the compression help (2p)
How the message flows of c), d) and e) compare to the uncompressed message flow in a)? What can be said about the suitability of SIP for mobile use (e.g. in GPRS networks)? How about for WiFi use?

g) – What about ISDN (1p)
How the amount of signaling traffic in SIP call setup compares to ISDN call setup? (See ISDN lecture slides 4-34).

Task 2 – H.323 and SIP (3p):
Compare H.323 and SIP protocols. Mention at least five fundamental differences.

Task 3 – Audio coding (2p):
Get familiar with following audio codecs: G.711, G.723.1, G.729, and GSM 06.10. Find the main characteristics for those speech codecs (sampling rate, bit rate, frame size (in milliseconds)).

Task 4 – SIP Architecture (4p):
What are the main architectural components of the SIP infrastructure? Explain the function of each component.