1 Abstract

The provided SIP-IMS model is an enhancement over the original SIP model provided in the standard model library of OPNET Modeler to allow simulations based on the IMS (IP Multimedia Subsystem), featuring a full implementation of the IMS session establishment mechanism (comprising UAS and UAC processes, C-CSCF, P-CSCF and I-CSCF intermediaries, multidomain and roaming support) as well as process’ delay control in intermediaries and intermediaries’ redundancy.

2 Description

The provided SIP-IMS model is an enhancement over the original SIP model provided in the standard model library of OPNET Modeler to allow simulations based on the IMS (IP Multimedia Subsystem).

Standard SIP support in Modeler is not enough to simulate IMS scenarios because:

- It doesn’t allow the use of more than one SIP proxy, interacting among them, between two user terminals.
- It doesn’t consider all the CSCF intermediaries architecture of the IMS, needed to establish an IMS session, and their implications in multidomain and roaming scenarios.
- It doesn’t consider all the messages that take part in a dialog among SIP intermediaries in the IMS.
- It doesn’t allow the control of intermediaries’ process delays.

The provided SIP-IMS model features:

- Full implementation of the IMS’ session establishment mechanism, including:
  - The three types of SIP-IMS intermediaries: C-CSCF, P-CSCF, I-CSCF.
  - The UAS and UAC processes.
  - All the involved SIP messages and their flow among the intermediaries.
  - Multidomain and roaming support.
• Possibility of using SIP intermediaries’ redundancy.
• Process delay control for each SIP message in the intermediaries.
• HSS queries delay control (queries to the HSS are modelled as a delay)

3 Setup guide

The installation of this model and their test scenarios comprises the following steps:

• Copy all the content of the provided SIP folder to a new folder in the machine that runs OPNET Modeler
• Include the new folder in the models directory list of Modeler using the option File/Model Files/Add Model Directory.
• Add a new path to the header files clicking on Edit/Preferences and adding to the variable comp_flags_common the parameter –I immediately followed by the path containing the header files. For instance, supposing the SIP folder was copied to C:\SIP, the parameter would be –IC:\SIP\include.

This will make the provided SIP-IMS model the default SIP model for all the simulations. In order to use the original Modeler’s SIP model, simply remove the provided model’s directory from the model directory list of Modeler.

It’s recommended to force model recompilation (Execution/Advanced/Compilation) for the first simulation involving the provided SIP-IMS module to avoid using the compiled version of the original Modeler’s SIP model.

4 Model specific attributes

There are new attributes in both the SIP Proxy Server model and the UAC model needed to configure the scenario.

4.1 SIP Proxy Server attributes

Figure 1 shows a sample SIP proxy server configured as S-CSCF, which serves the domain operador1.es and the geographical area of Madrid. The term “area” must be understood as a way to assign a group of users to a certain server, not necessarily a geographical area.
Figure 1. SIP Proxy Server new attributes

4.2 User Agent Client attributes

Figure 2 shows the new SIP UAC attributes of the provided model. Domain Name is the home domain, while Current Domain and Current Area refer to the actual network that is serving the user so, in case the user is in roaming, they refer to the visited network.
Figure 2. User Agent Client new attributes

5 Sample scenarios

Sample scenarios are provided in the SIP folder.