Demonstrating Forwarding on Gates with first Applications

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1. Introduction

Forwarding on Gates (FoG)[1] is a new approach for an inter-network like the Internet [1]. It is a clean-slate architecture designed to replace the Internet Protocol (IP) version 4 and 6. The key features of FoG are a link-oriented view supporting inter-network wide quality of service (QoS), invisible (or even no) addresses of network entities enabling dynamic re-addressing of the whole inter-network, enhanced security by built-in authentication and the possibility to integrate any application functionality into the network.

2. Project G-Lab FoG

The project G-Lab FoG reaches its first milestone M1 at the G-Lab status seminar at the EuroView 2010 as described in the project plan. For M1, the feasibility of FoG has to be shown. For this purpose we will provide a demonstrator presenting the main FoG concepts. It is based on a simulation implementing the specification, which had been developed in the first 10 month of the project. In detail, this includes the logical functions of FoG shown in Figure 1.
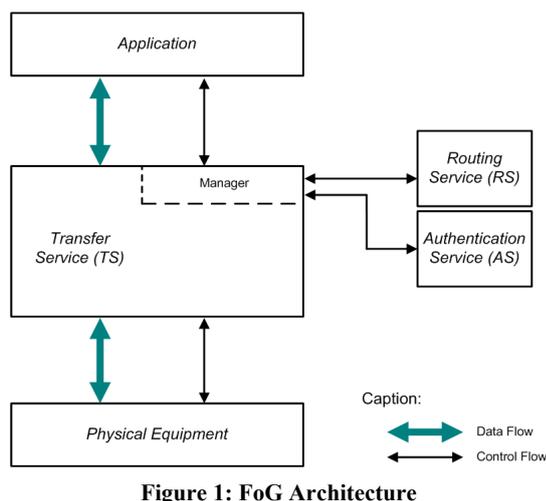

Figure 1: FoG Architecture

Within FoG, the transfer service is responsible for transferring data through the gates and forwarding nodes. Hence, it needs a route, which specifies the gates a packet has to pass. The route is calculated by the routing service. In order to satisfy scalability requirements, the process of route calculation can be done incrementally during the transfer process of a packet. In the simulation, the layer below FoG is implemented as simple buses connecting simulated hosts. The built-in authentication for a secure management of the gates and the identification of requesters for the routing service is part of the authentication service. It uses the check sum and encryption methods provided by Java in order to sign signalling messages.

The simulation of FoG can be distributed among multiple (physical) hosts. A single simulation runs in parallel on multiple hosts connected via the Java middleware Jini [2]. This feature enables a distributed simulation of FoG over IP in the G-Lab experimental facility. This overlay mode of FoG is used for the first demonstration applications described in the next section.

3. Demonstrator applications

With the FoG simulator, we will demonstrate three scenarios described in the following passages.
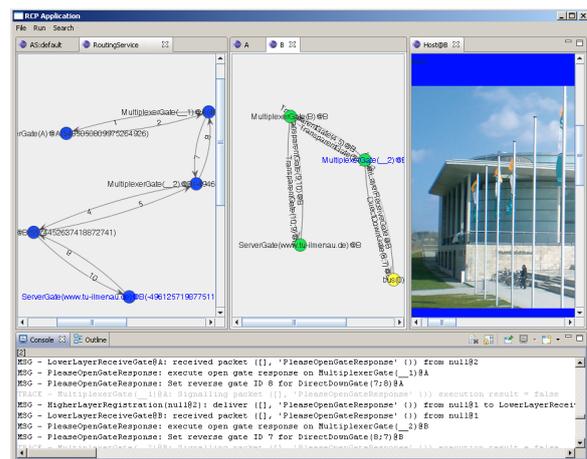

Figure 2: Web browsing via FoG

The first example application will be a web browser, which is able to show web sites from external IP-based web servers. A first screenshot of this browser and its simulation environment is depicted in Figure 2. The FoG

routing service is shown in the window on the left side of the figure. In the middle, the gates and forwarding nodes on the simulated host connecting the current Internet with the FoG simulation are shown. The right side displays the output of the web server. The requests of the web browser are directed to a simulated FoG host. It starts the incremental routing process constructing all gates which are necessary for the HTTP connection. During the transmission, a special interoperability gate acts as point of intersection between FoG and the known IP based Internet.

Another very simple chat application will be used to demonstrate the live character of transmissions. With the help of this software a chat between two text based windows will be possible.

As a third demonstrator application, a live video streaming will be shown. For this purpose a webcam with audio support will be used to capture live data. The data streams are transmitted via FoG. With the help of this application scenario we want to demonstrate the power of gates and their native support for QoS and data stream separation. The live video will be visible in a window and the audio streaming will be depicted as sound volume level display. Both streams will be configurable and additional statistic views will be shown reflecting the internal activities of the network.

[1] F. Liers, T. Volkert and A. Mitschele-Thiel: Forwarding on Gates: A clean-slate Future Internet Approach within the G-Lab project, *Euroview 2009*, Würzburg, 2009.

[2] Jini.org – The Community Resource for Jini Technology, http://www.jini.org, 2010.

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