CS 354 Project 3: Network Address Translation

Group 41:

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Contents

1 Introduction

For this project we were tasked with implementing a simulated router with minimal NAT functionality, as well as a simple client.

The router processes paquets received from clients, who are either marked as internal (hosts in the local network) or external (hosts belonging to an external network).

Clients send simple paquets to one another, and the router has to process these paquets in an appropriate manner, depending on the following cases:

- **Internal → Internal**: The paquet is forwarded without changing its data
- **Internal → External**: The paquet header is modified and an entry is added to the NAT table, or refreshed if it already exists, that binds the source IP/port to the destination address.
- **External → Internal**: The paquet is routed according to the entry in the NAT table. If there is no corresponding entry in the table for the source, the paquet is dropped and an error paquet is returned (unless something like port forwarding has been implemented).
- **External → External**: Paquets are dropped, as they should be routed by external networks.

Additional features we needed to implement were:

- **NAT table**. The address translation table should refresh dynamically.
- **DHCP**. Internal clients should automatically request and be assigned an address by the NAT server.

1.1 Overview

In this document we will provide a complete view of our implementation, by discussing its design (§6), giving a breakdown of the files into which it is organized (§2), and providing a high level description, providing more details where necessary, of the flow of execution of the two programs which it comprises (§3).

We are confident that our implementation meets all of the requirements. However, we did not implement any features beyond those listed in the requirements either. Therefore, we do not include sections dedicated to unimplemented or additional features, as it would be superfluous.

Furthermore, we will discuss issues we encountered during the development process (§5), experiments we have conducted (§4), compilation and execution of the router and client (§7 and §8), as well as the libraries we made use of (§9).

2 File Descriptions

3 Program Description

4 Experiments

5 Issues Encountered

6 Design

7 Compilation

It is assumed that the project will be run on Linux from a Bash shell.

7.1 Dependencies

8 Execution

9 Libraries