
Semester thesis for Markus Frauenfelder

Representation of a Network

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Issue Date: 29th March 2005
Submission Date: May 2005

1 Introduction & Motivation

There are many ways a network can be represented. They can be split in two categories: textual and graphical representations. Computers only understand textual representations, whereas humans prefer graphical ones.

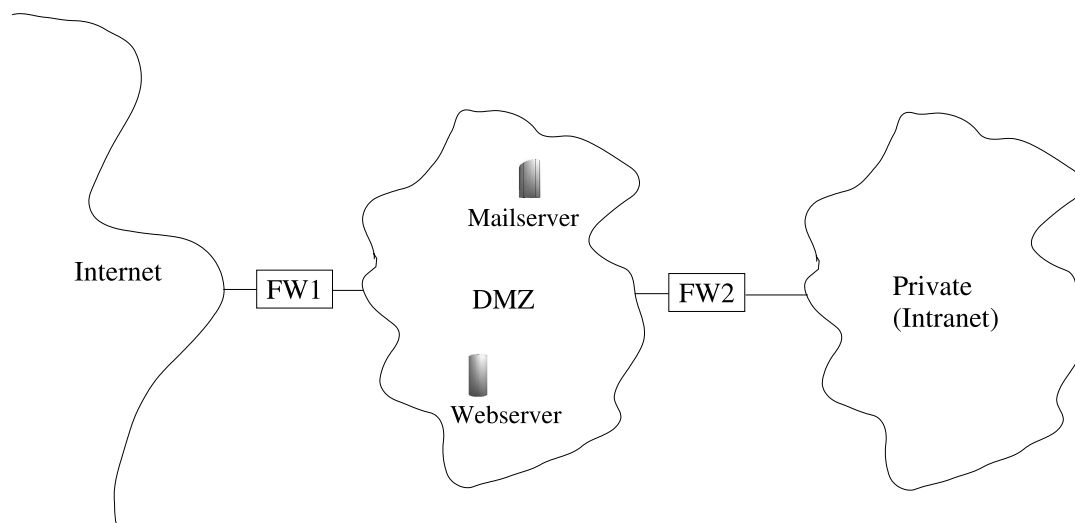


Figure 1: A sample graphical network layout

To conduct firewall testing, one needs to know the network under test. There are different ways to gather this information, e.g. by collecting and combining configuration files or by letting a person draw it. Thus, depending on the gathering method, we either get a textual or a graphical specification of the network under test. For the automatic generation of test cases, we need a textual network specification. To later visualise the flow of different packets through the network, it would be nice to do that in a graphical network representation. Thus, we need a tool that can convert graphical network representations in textual ones and vice versa.

DMZ: 129.132.178.192/24
 Private (Intranet): 192.168.1.0/24
 Internet: !DMZ, !Private

@ Name of the Firewall	Interface	Network behind	Properties
FW1	eth0 (0.0.0.1)	Internet	
FW1	eth1 (129.132.178.193)	DMZ	
FW2	eth0 (129.132.178.194)	DMZ	Packet filter
FW2	eth1 (192.168.1.1)	Private	Packet filter

* * *

@ Name (fac.)	IP	Service
Mailserver	129.132.178.200	smtp
Mailserver	129.132.178.200	imap
Webserver	129.132.178.197	http

Figure 2: A sample textual network layout

2 Assignment

2.1 Objectives

The result of this thesis should be a tool with the following features:

- network layouts can be specified¹ either graphically or textually
- specifications of network layouts can be displayed either graphically or textually (independent of the way they were specified: thus there need to be converters between the two representations)
- it should not rely on closed source software
- it should be slim, extendable and easy to use

2.2 Tasks

The mandatory tasks of this semester thesis are:

- Searching of related work and tools.
- Evaluation of the tools found.
- Adapting one tool for our needs (which will then be used for graphical network specifications)
- Writing a converter between graphical and textual network specifications.

Possible extensions of the tool include:

- 1) the “graphical” specification of a formal network security policy
- 2) the computation and visualisation of the shortest way between two IPs

If there is enough time, one of these extensions can be implemented as well.

¹the important parts are: IP(-Ranges), names (networks, firewalls, servers, firewall-interfaces), and connections between interfaces

2.3 Deliverables

- At the beginning of the thesis an agreement must be signed which allows the supervisor of this thesis, his project partners and ETH Zurich to use and distribute the software written during the thesis.
- At the end of the first week, a time schedule of the semester thesis must be given and discussed with the supervisor.
- At the end of the semester thesis a presentation of 20 minutes must be given during an Infsec group seminar. It should give an overview as well as the most important details of the work.
- The final report may be written in English or German. It must contain a summary written in both English and German, this assignment and the schedule. It should include an introduction, an analysis of related work, and a complete documentation of all used software tools. Three copies of the final report must be delivered to the supervisor.
- Software and configuration scripts developed during the thesis must be delivered to the supervisor on a CD-ROM.

29th March 2005

Prof. D. Basin