# Abstract

The current trend of the Telecommunications networks leads to the substitution of the specific hardware for the network functions inside the IT infrastructures with a general purpose one using the virtualization of the function itself.

For this reason, some projects have been already developed in order to define Virtual Network Functions (VNF) and to test the models of the network before the real deployment, checking the satisfiability of some properties (it could be a tricky aspect especially in the networks that need an automatic reconfiguration in response to traffic or user events).

These studies use First Order Logic (FOL) formulas to describe the function’s behaviour, the structure of the network and the properties to check inside it, and a Satisfiability Modulo Theories (SMT) solver in order to determine if the properties could be satisfied or not.

But analysing their structure, these projects result quite difficult to use in a real situation because of the complexity of the VNF definition and the network testing.

So, starting from these previous results, the objectives of this thesis is the development of a framework that allows Virtual Network Function modelling in a easy way and offer a tool for the verification of the service graph created.

In order to guarantee the easiness of usage, a well-known programming language has been chosen for the VNF’s modelling: Java. Using it, a library has been developed and it represents the set of instructions available for the user for describing his own network function’s behaviour.

Then using a Parser, the input file written with the library is converted into an other Java file that contains the FOL formulas that define the behaviour of the VNF. This new file represents the input supplied to Z3.

At the end, all the VNF defined in the previous projects have been rewritten and the corresponding Z3’s source file have been obtained through the Parser. Then all the tests previously defined have been rebuilt with the new classes and their results have been compared with old ones in order to ensure the efficiency and the reliability of the project.