# Deployment of Monitoring Functions in a Software Defined Network

Romain Moulin – 4IR SC
TNO – The Hague – The Netherlands

Key words : *SDN – Monitoring – Scripting – Ansible – Grafana – ODL - Prometheus*

## About TNO

TNO is a dutch organization for applied scientific research. It has 24 sites in the Netherlands and also 1 in Belgium and 1 in Japan. More than 3500 employees work at TNO. The organization is divided in 6 main units :

- Mobility & Built Environment
- Energy & Material Transition
- Defense, safety and security
- Healthy living & work
- High Tech Industry
- ICT, Strategy Policy

## Objectives of the Internship

- Learn about Software Defined Network (SDN)
- Establish a strategy to monitor the state of the devices on a Software Defined Network (SDN)
- Develop code to retrieve and display the topology of the network
- Create user friendly interfaces for the network administrator
- Deploy automaticaly the different through scripting

## Work Done

### Import metrics from the devices ✔

Importing the metrics from the different devices is the core component of our project.
To efficiencly monitor our devices, the main metrics that we pull are the actual bandwidth and the capacity of every links.

*Technologies used: Prometheuse, SNMP, sFlow*

### Retrieve the topology ✔

It is important for the network administrator to see the topology of the network. In order to get it, and as in the context of SDN, we can request this information to the network controller.

*Technologies used: OpenDayLight, REST API*

### Display the results ✔

To have a powerful graph we fuzed the metrics pulled from the devices with the network topology.
That way, the network administrator can see in one graph the topology as well as the usage percentage of every links.

*Technologies used: Grafana, Javascript*

### Automatic deployment ✔

Scripting is an important part of work. It allows us to deploy easily our monitoring features on different architectures without needing someone to install everything manually

*Technologies used: Ansible*

## Technical developpement

- Software Defined Network
- Ansible scripting
- Monitoring functions
- New technologies

## Personal developpment

- Expressing in English
- Being independant
- Discovering a new culture
- Confirmation of my professional project

## Conclusion

To conclude, this professional experience abroad was very interesting and enriching as much technically than personally. I had the opportunity to meet people pationate about their work and it reinforces my wish to be a network engineer in the future.

*Icones: www.flaticon.com*

*Présentation des stages de 4ème année 2022- 2023*