Innovation Placement Project: Network Control Innovation (Software Defined Networking)

Summary

Industry partner: ADVA Optical Networks

Location: ADVantage House, Tribune Way, York, YO30 4RY

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Project overview

ADVA are an innovative, mid-sized network Equipment manufacturer of Optical WDM systems, Ethernet switches, Network Function Virtualisation and Timing solutions. The York office is a thriving innovation hub with many exciting ongoing projects at the cutting edge of telecoms innovation (5G Mobile Architectures, Quantum Key distribution etc). This project looks at the area of automation and control.

Historically networks have been controlled through manual processes and cumbersome Network Management Systems (FCAPS) that have been expensive and provide limited scope for service innovation. Recently there has been a move to using modular open source software to create solutions that are richly featured, low cost and fast to deploy. This project seeks to understand the maturity of such solutions, understand the ease of use and robustness through an evaluation of leading open source projects. This evaluation would involve downloading, deploying on lab networks. Once a base solution is selected then the project would seek to couple to recent advances in automation which can be linked to Artificial Intelligence/ machine Learning techniques. Academic interest in the applicability of these techniques to telecoms networks stretch back some 30 years but recent advances in computing power, refinement of AI/ML techniques and better data collection have led to more commercially applicable solutions. Areas of interest are Time series prediction (traffic analysis etc), classification (component failure analysis), optimisation (optimal network routing) etc. These problems can be broadly characterised as AI/ML and can be resolved using different techniques such as Neural Networks, Genetic Algorithms, Expert Systems, Statistical methods etc.

Activity to be undertaken

Hands-on evaluation of current open source (and commercially available) SDN controllers. ONAP, ONOS, Open Daylight and supported commercial variants.

Select one to show how SDN controller can be used manage a series of devices using Netconf/YANG to set up an end-end service, flex the bandwidth of the service, re-route the service on failure using a number of device-based failover and SDN controller route optimisation techniques.
Link the route optimisation/failure to AI engine and Path Computation Engine and explore the network optimisation

**Skills / Knowledge / Expertise**

Skills expected from graduate are primarily software in nature. An understanding of Linux is essential, ability to deploy solutions. Knowledge of computer networks/telecoms networks is required. Some ability to code GUI functionality is desirable.

Industry guidance will be available from ADVA Advanced Technology but day-to-day guidance will be from local York technical team who are delivering real customer solutions.

**Deliverables**

Written evaluation of the current state of opensource SDN controllers.

Implemented SDN control solution for deployment of services on a lab network

Theoretical study on the use of Path Computation Engines for optimised path placement across a small network including failover scenarios

AI/ML extension to provide optimisation of network given a specific traffic matrix.