Review of Dissertation Thesis

Using SDN to Enhance IoT Security
Author: Ing. Filip Holik
Study program: P2612 - Electrical Engineering and Informatics
Supervisor: prof. Ing. Simeon Karamazov, Dr.
Co-supervisor: Mgr. Josef Jan Horalek, Ph.D.

Evaluation of Doctoral Thesis

The thesis contribution is placed at the intersection of three strategically important and highly topical research fields, namely Software Defined Networking (SDN), Internet of Things (IoT) and network security. The contribution is scoped around Smart Cities, providing a "blueprint" through which SDN applications can be realised within this environment.

The thesis begins with a short summary of the key research fields, SDN, IoT and security and provides context within which these domains can be bought together.

Chapter 2 goes on to provide a detailed background study of SDN and IoT. This starts with a historical perspective, looking at how the work in this area can be traced back to active and programmable networking research carried out during the 1990's. The architecture of SDN is described, along with the core behaviour of the OpenFlow protocol. Discussion of other SDN concepts, such as Hybrid SDN, are also presented. The chapter also includes coverage of Network Functions Virtualisation, a closely related topic to SDN. The chapter then moves onto IoT, and describes a series of IoT architectures and application domains.

Chapter 3 covers Related Work in the area of SDN, with specific attention given to SDN in the context of IoT and associated IoT areas.

Chapter 4 describes the main contributions of the thesis. It considers SDN in the context of a number of application domains (in order to narrow the scope of the thesis), ultimately focusing on Smart Cities.

Chapter 5 analyses Smart Cities, initially describing a Smart City architecture followed by coverage of the primary communication protocols used within a Smart City. It then explains potential security issues relating to Smart Cities and concludes with a set of requirements for Smart City applications.

Chapter 6 represents a key contribution of the thesis, describing the "blueprint" for deploying SDN applications into Smart Cities.

Chapter 7 describes a use-case application for securing Smart Cities using SDN and verifies the blueprint through this approach.

Finally, Chapter 8 concludes the thesis.

In terms of the contribution made to the overall subject field, I believe that the area of work covered in the thesis is of the correct standard in terms of originality, and makes an appreciable contribution to knowledge – the work has the potential for impact in this important field. There is ample evidence within the thesis to demonstrate that the candidate appreciates the relationship of the subject to a wider field of knowledge.

I would say that the thesis is well written and orderly, and is of the correct standard. I recommend the thesis is accepted for defence to achieve a Ph.D.

Finally, I have a number of questions that I would suggest are raised with the candidate for discussion:

- How will emerging SDN technologies (such as P4) influence the architecture and approach taken?
- How can you maximise the chances of the blueprint being adopted? Who are the anticipated users?

Professor Nicholas Race, 4th October 2018

Director of Research
School of Computing and Communications
Lancaster University, Lancaster, UK, LA1 4WA

School of Computing and Communications | InfoLab21 | Lancaster University | LA1 4WA
Tel: 01524 510302 | **Email:** scc@lancaster.ac.uk
www.scc.lancs.ac.uk