

Analysis of virtual core network technics in Internet of Things

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Abstract:

The Internet of Things (IoT) allows the connection to anything, anywhere, at any time, resulting in pervasive networks of heterogeneous objects. Because there will be so many devices, enormous amounts of data are generated, necessitating the installation of additional network access and core equipment. Numerous technological challenges exist for the smooth operation and incorporation of such massive IoT systems. In addition, the possible mobility of IoT devices results in dynamic alteration in topology, which may need flow re-establishment. Although it may be challenging to develop a single solution to address all of the issues, virtualization can minimise the complexity of individual solutions. Virtualization is a software technology that logically abstracts the underlying hardware components in a network. It separates the decision-making and packet forwarding.

The control is decoupled from the hardware, making it easy to adapt, administer, and update. To provide more efficient end-to-end data communication services to the users, data plan, control plan and management plan functions are detached from each other. Strong and optimized algorithms are applied in the control plan to schedule the communication resources inside of the core network. Software Defined Network and Network Function Virtualization techniques are applied in practice based on standardized control protocol called OpenFlow.

A model that simulates real-world case situations was tested in practice as part of this research. The software tools utilized were: i) VirtualBox to create multiple virtual machines and connect them together; ii) GNS3 to create virtual network topologies using real network operating systems working on virtual network devices; iii) OpenDayLight and Open Flow Manager software tools to provide the SDN virtualization solution; iv) Wireshark to extract the traffic between the SDN controller and the network devices inside the GNS3 software; v) Own developed Python scripts to analyse the captured traffic.

The idea of separating the control and forwarding functions in network devices was tested. The tests and analysis that were accomplished in this project can be considered when implementing real large-scale solutions. The workt includes multiple versions of data analysis. Each version generates different output graphs. As the modelling purpose is to simplify the real environment or to obtain samples and examine the behaviours of the system, the analysis carried out in this project can be used on large scale in the real environment and developed further for different purposes.