Software Defined Networking in the Internet of Things

John Schonebaum
Division of Science and Mathematics
University of Minnesota, Morris
Morris, Minnesota, USA
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Outline

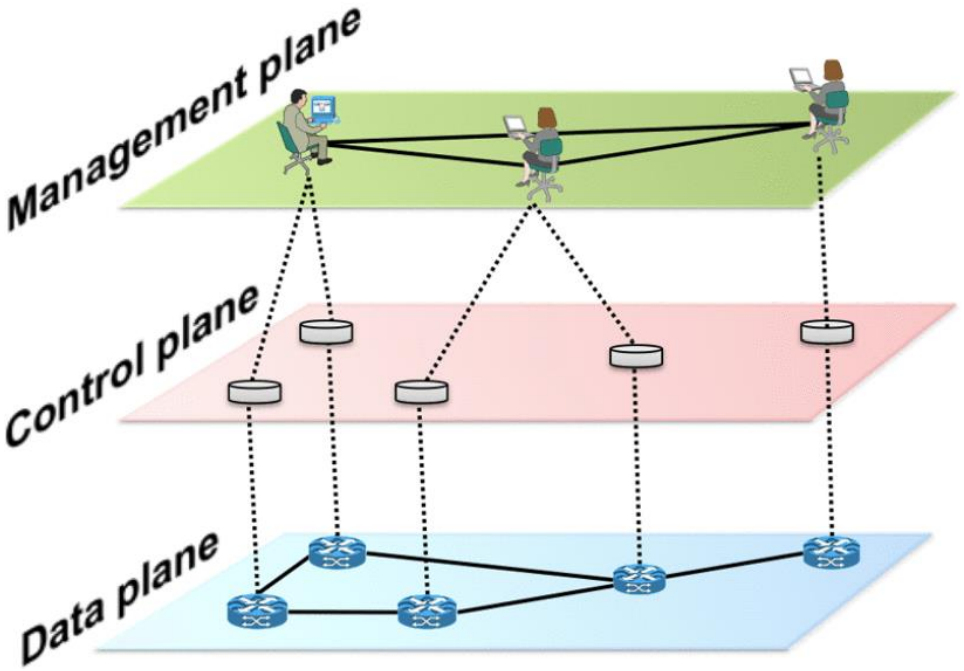
1. Introduction
2. Background: What is SDN?
3. OpenFlow switches
4. IoT SDN controller architecture
5. Conclusion/Acknowledgements

Introduction- IoT

- Internet of things: the extension of internet connectivity to physical devices and everyday objects
- Large increase of IoT devices
- IoT traffic creates challenges for networks

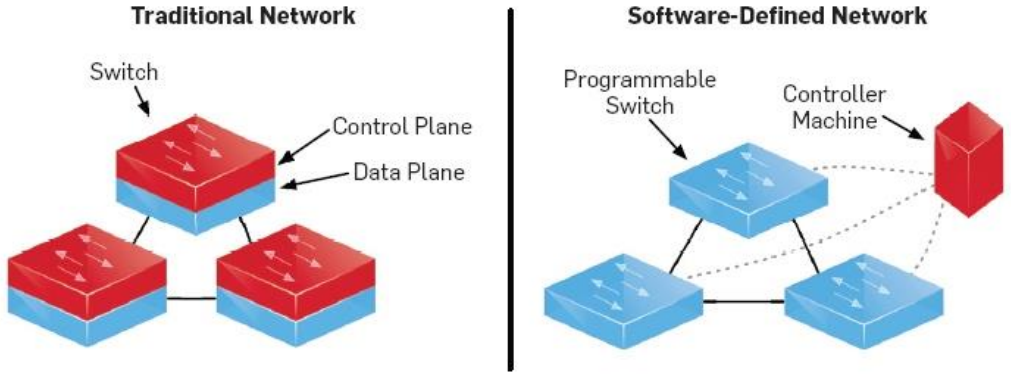
Status quo of networking

- 3 plane structure
- Vertically integrated
- Slow to adjust to change
- Difficult to manage

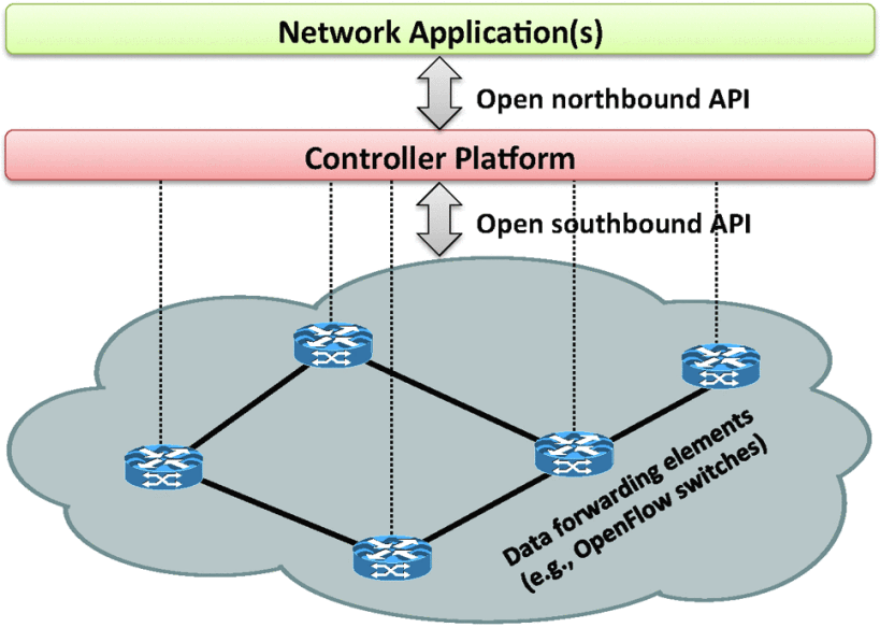


What is Software Defined Networking?

- Break vertical integration (separation of control and data plane)
- Creation of centralized of SDN controller
- Programmable network



View of SDN architecture

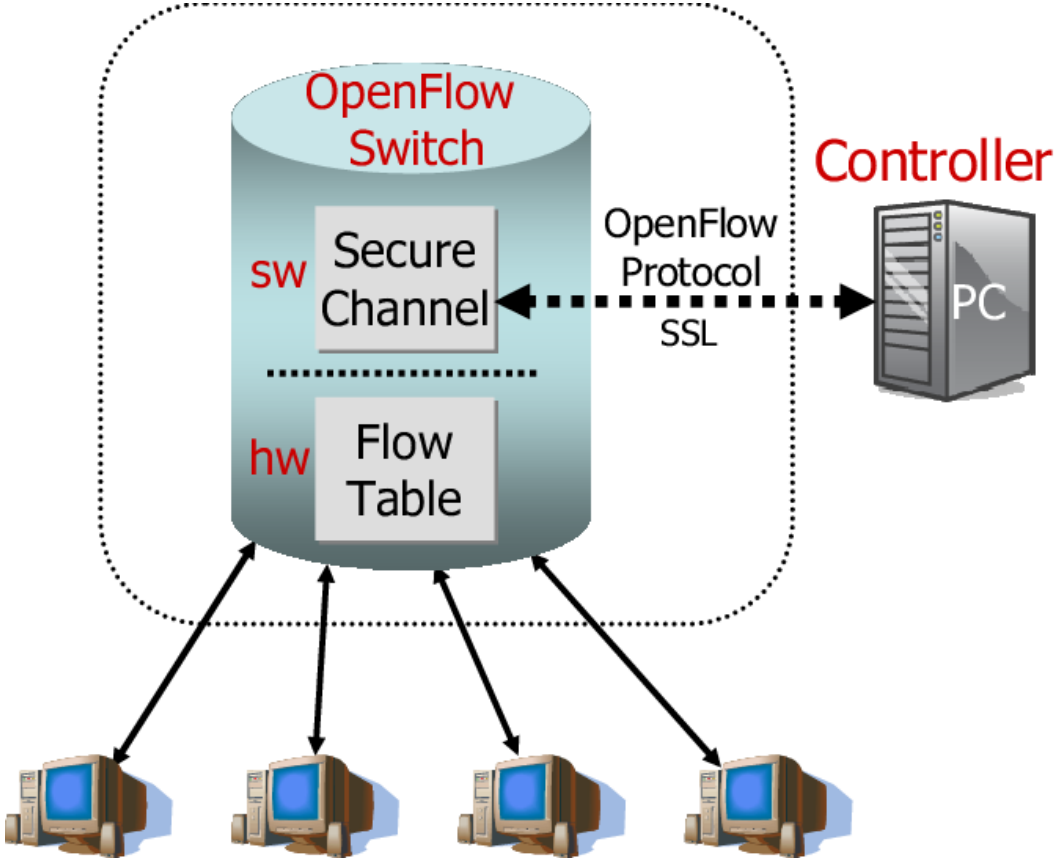


Purpose of SDN

- Programmable network
- Enforcing network policy with centralized controller
- Global view of network
- Virtualize network hardware

OpenFlow switches

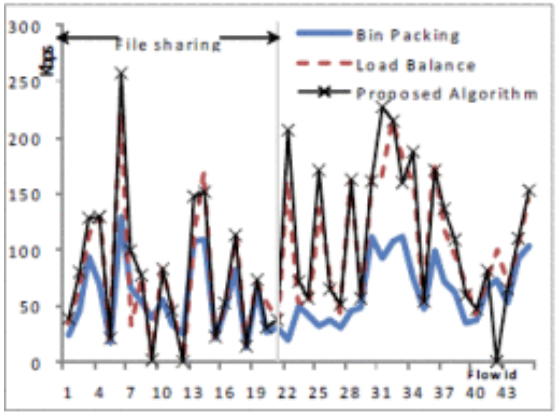
- One of the first and most widely used southbound standards for SDN
- Created as a way to run experiments on campus networks



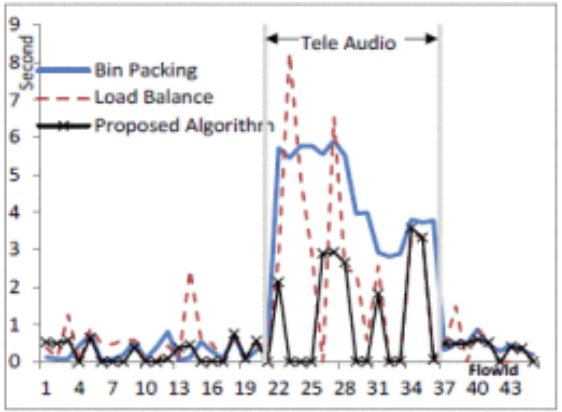
An OpenFlow switch

IoT SDN architecture

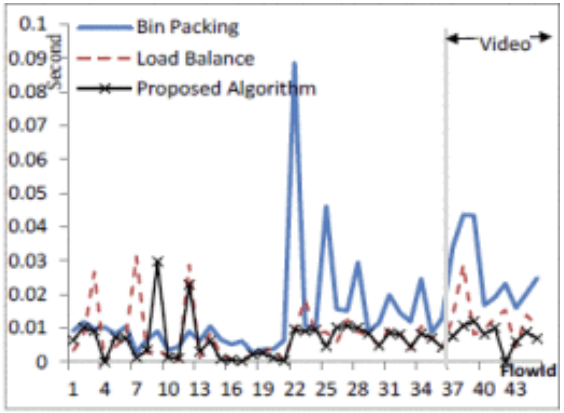
- SDN controller designed to function in an IoT landscape
- Flow Scheduling algorithm based on the Genetic Algorithm
- QoS performance was tested against two other flow scheduling algorithms in a simulation



(a) End-to-End Throughput



(b) End-to-End Delay



(c) End-to-End Jitter

Performance results of proposed flow scheduling algorithm

Conclusions

- IoT presents new networking challenges. Current networks are static and complex to manage and control.
- SDN aims to separate the control and data planes of a network and create a centralized SDN controller
- OpenFlow switches were designed as a programmable network
- Examined the performance of an SDN controller designed to work in the IoT environment

Status of SDN

- Google was one of the early adopters of SDN. In 2012, they announced at the Open Networking Summit that one of their largest networks was 100% running on an openflow based network
- Google Andromeda 2.1 (2018): Google's SDN platform improved latency over version 2.0 by 40%

https://www.networkworld.com/article/2222173/google-showcases-openflow-network.html
https://cloud.google.com/blog/products/gcp/andromeda-2-1-reduces-gcps-intra-zone-latency-by-40-percent

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Questions?

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