SDN-based Smart Gateway for Internet of Things

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What is Internet of Things (IoT)?

- Physical devices or objects **connect** with each other and form the IoT.
- IoT aims to **integrate** real-world data into current networking technologies.
“Things” Connected To the Internet

During 2008, the number of things connected to the Internet exceeded the number of people on earth.

By 2020 there will be 50 billion.
IoT for Home Environment

- Smart Home (SH) environments evolve from the current Machine-to-Human to the Machine-to-Machine (M2M) communication.

- Heterogeneous devices are interconnected with the several different subnetworks.
Home Gateway

- Home gateway, or residential gateway enables the connection of home to the Internet.

- Home gateway tends to have abundant interfaces, powerful functions such as routing, NAT and firewall, etc.

- Home gateway connects different IoT devices.

Image Courtesy: www.intel.com/

Image Courtesy: www.engadget.com/
Problem Statement

- Management of complicated applications and hardwares in home IoT environment.
- Network traffic management for different IoT devices.
- Support of different kinds of network functions for different devices.
SDN-based Smart Gateway
SDN-based Smart Gateway

- The Smart Gateway virtualizes the IoT devices and provide the resource management.

- Distributing the control plane and data plane functions allows networks to be more dynamic and intelligent in traffic management.

- Network Function Virtualization enables relocating subset of home gateway functionalities into cloud.
Use Cases

• Security as a Service
  ◦ Different levels of security
  ◦ Denial of Service defense
  ◦ Middleboxes

• Extended Home and Quality of Service
  ◦ Remote access and cloud service
  ◦ Low latency, sufficient bandwidth and service availability
Work in Progress

• Access control mechanism

• Evaluation of performance

• Privacy issues in traffic analysis
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Problem Statements:

- Traditional home gateway has limits in managing complicated applications and hardwares in home IoT environment.
- Home gateway is not capable of managing network traffic for different IoT devices.
- Home gateway has constraints in supporting different kinds of network functions for different devices.

Solution:

- An SDN-based Smart Gateway virtualizes the devices and provide the resource management.
- Distributing the control plane and data plane functions allows networks to be more dynamic and intelligent in traffic management.
- Network Function Virtualization enables relocating subset of home gateway functionality into cloud.

Use Cases:

- Security as a Service
  - Users are able to select different levels of security services according to their requirements.
  - Smart Gateway can provide defense services against attacks such as Denial of Service attack.
  - SDN along with NFV can provide middlebox services.

- Extended Home and Quality of Service
  - Smart Gateway provide to end-users some extended home capabilities such as remote access to home devices and services with mobile devices.
  - Smart Gateway ensures low latency, sufficient bandwidth and service availability.

Work in Progress:

- Access control mechanism
- Evaluation of performance
- Privacy issues in traffic analysis
Thank you!