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Lomonosov Moscow State University

Software-Defined Networks (SDN)

Lecture 12: SDN for Home networks

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Problems (1)

Стоимость организации подключения

- Проблема наличия собственной внутридомовой сети у каждого провайдера.
- Проблема эксплуатации сети одного оператора со множеством Wi-Fi маршрутизаторов.
- Проблемы эксплуатации одной сети множеством операторов совместно.

Problems (2)

Сложность управления

- Отсутствие необходимой квалификации у самих домашних пользователей.
- Проблемы с частотным планом и мощностью Wi-Fi сигнала.
- Проблемы интерференции со сторонним оборудованием.
- Проблема использования аутсорс-решений.

Problems (3)

Подверженность сбоям

- Низкая квалификация специалистов.
- Интерференция.
- Малая надежность домашнего оборудования и отсутствие резервирования.

Goals

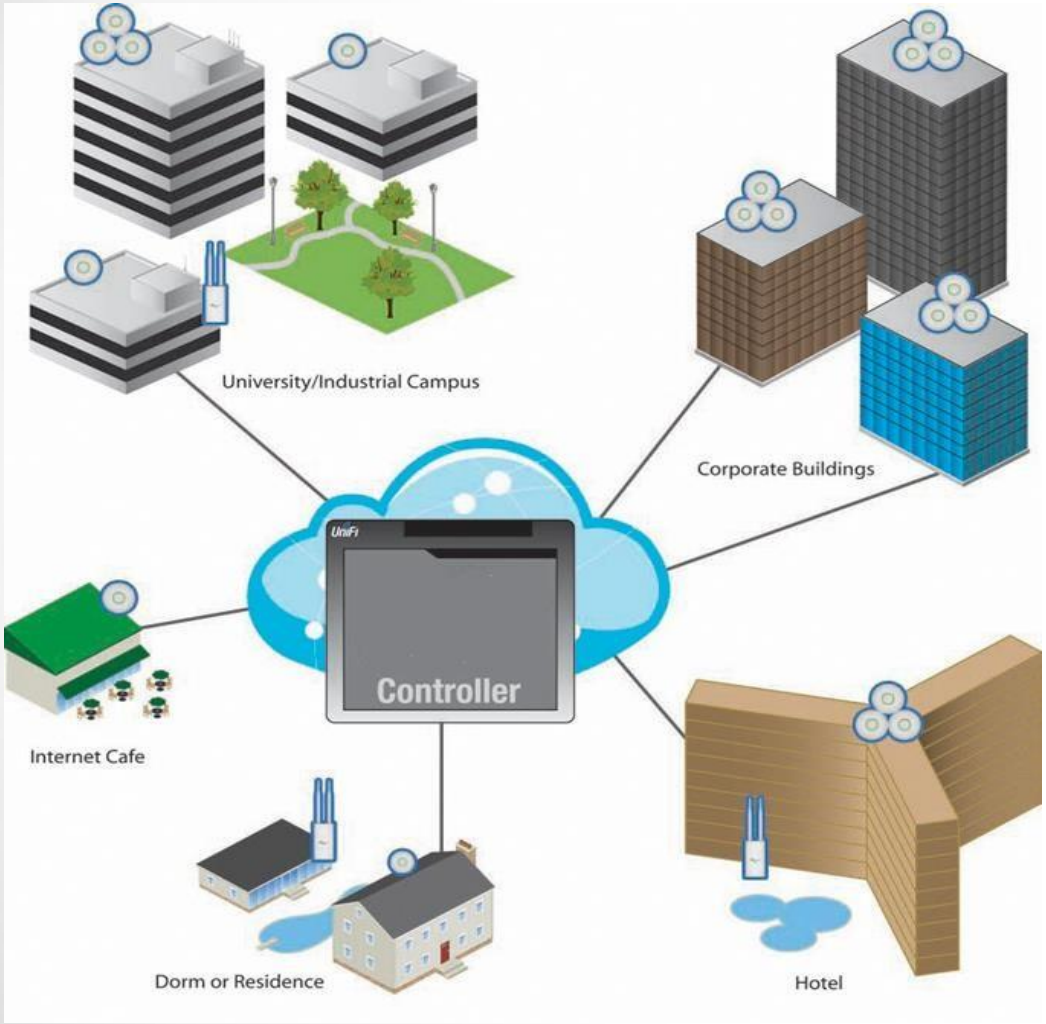
Provide traffic isolation
within the logical level

Provide bandwidth isolation

Provide independent management
logical levels

Provide the ability to flexibly configure the individual
behavior of the logic level

Centralized management of operator's Wi-Fi networks



- Centralized management of an extensive network
- Frequency plan management
- Network virtualization
- Wi-Fi signal strength control
- Seamless roaming
- Access your home network from anywhere
- Internet access from anywhere

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An example of using a SDN in a home network

Traffic usage assessment
by various users and applications

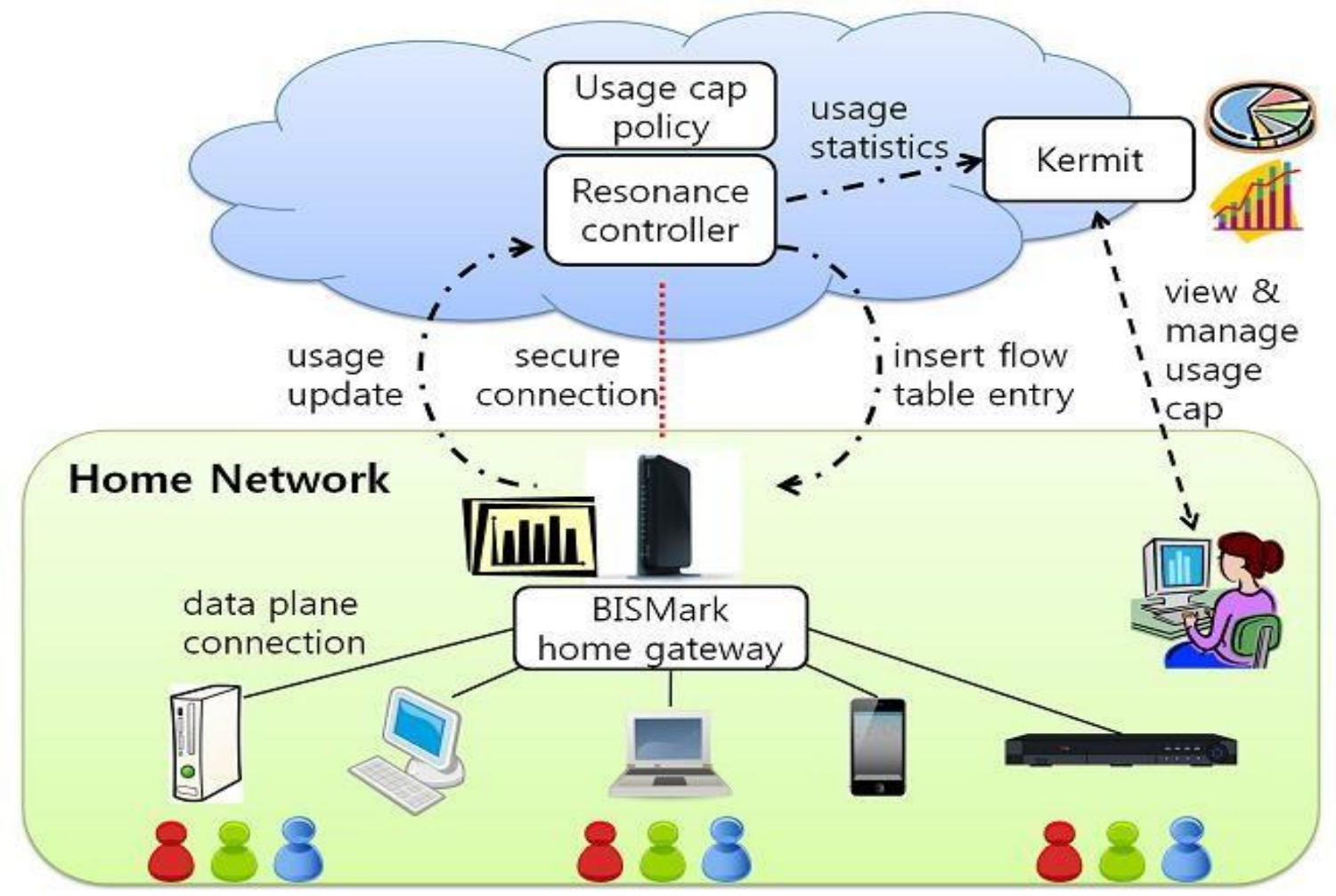
Distribution of traffic quotas,
including taking into account the time of day

Exchange of unused quotas between users

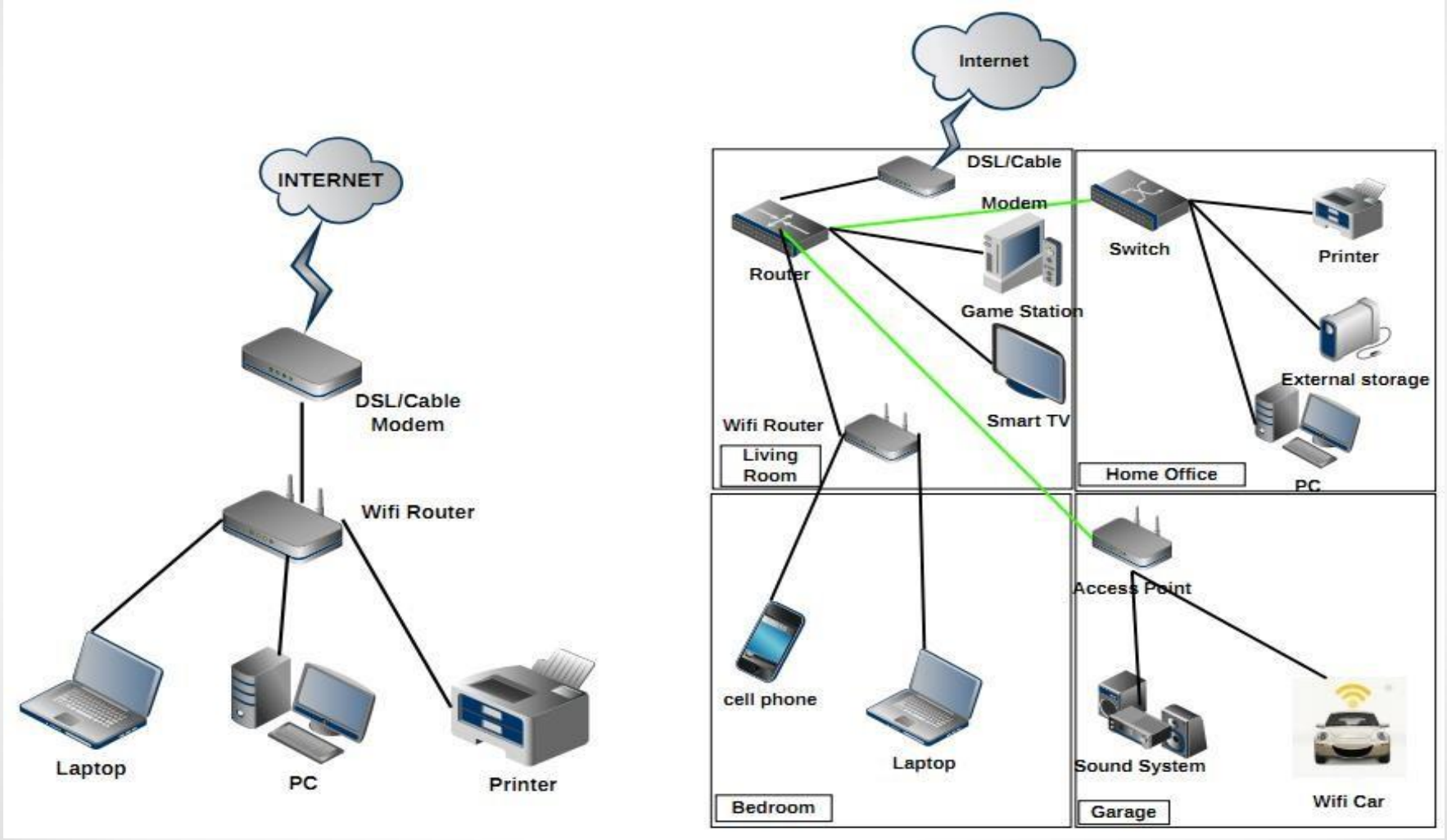
Solution of the following problems:

- Associating streams with devices, not users
- Providing a different set of policies to control user, application and device quotas
- Providing access to history and current statistics of traffic usage

An example of using a SDN in a home network



The past, present and future of home networking



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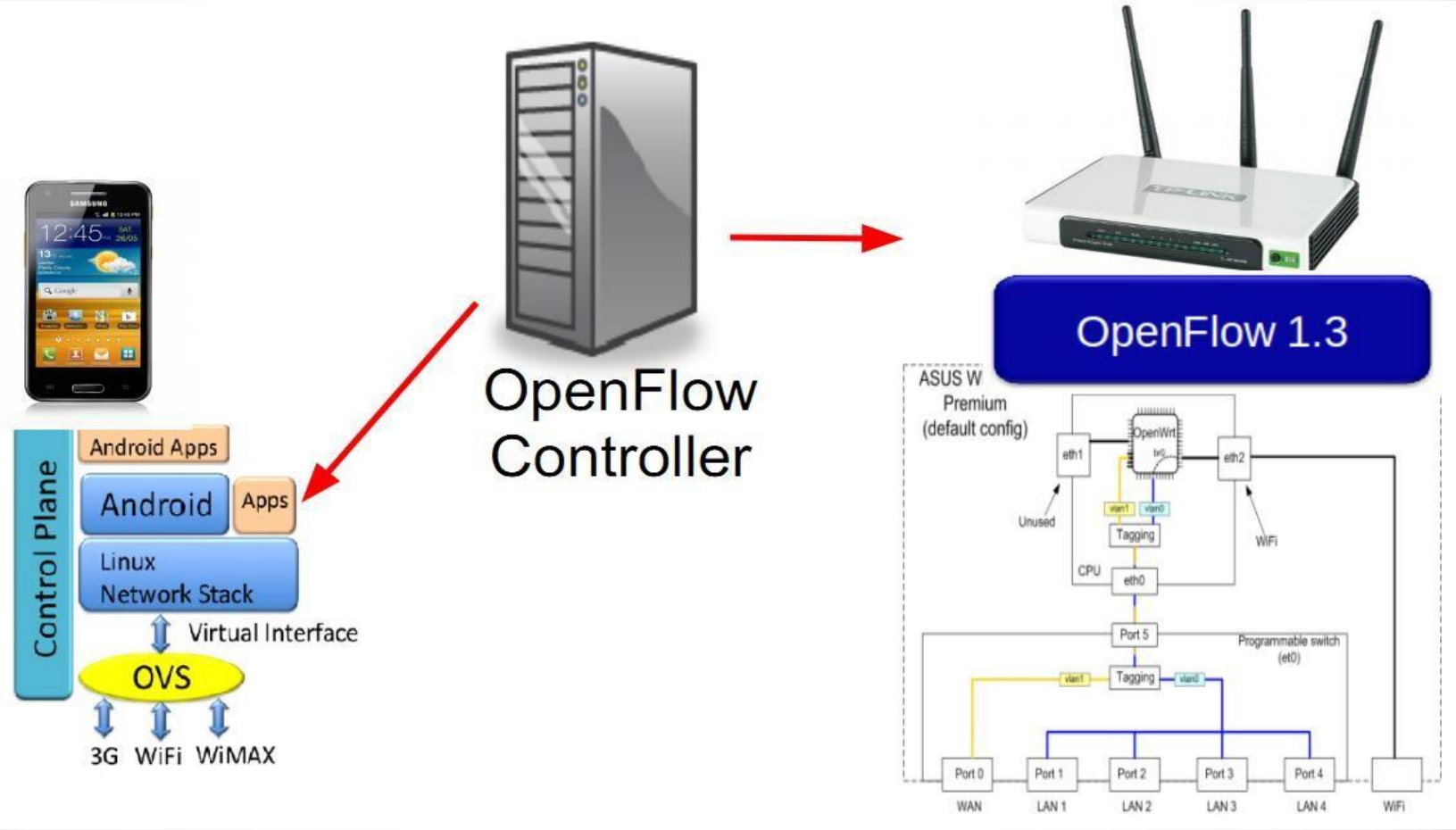
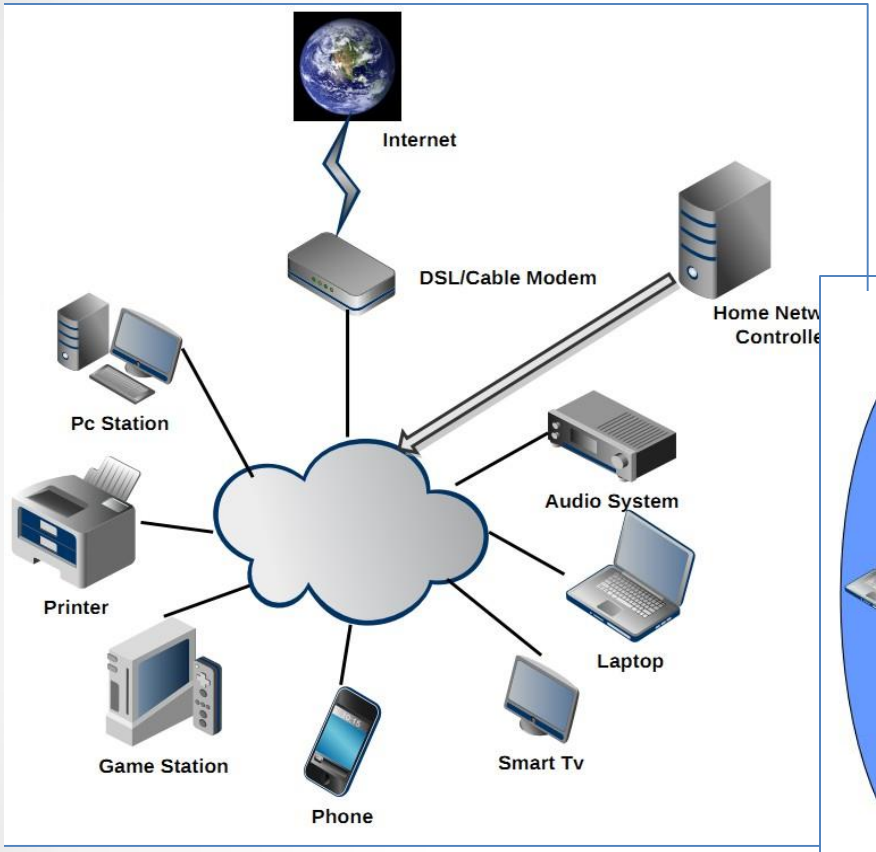
Use cases of home SDN networks (SDHN)

- Separating home and guest users
- Smart power grids (Smart Grid)
- Connecting to multiple providers
- Video sharing and conferences
- Using different access technologies
- Bandwidth management

SDHN – circuit diagram

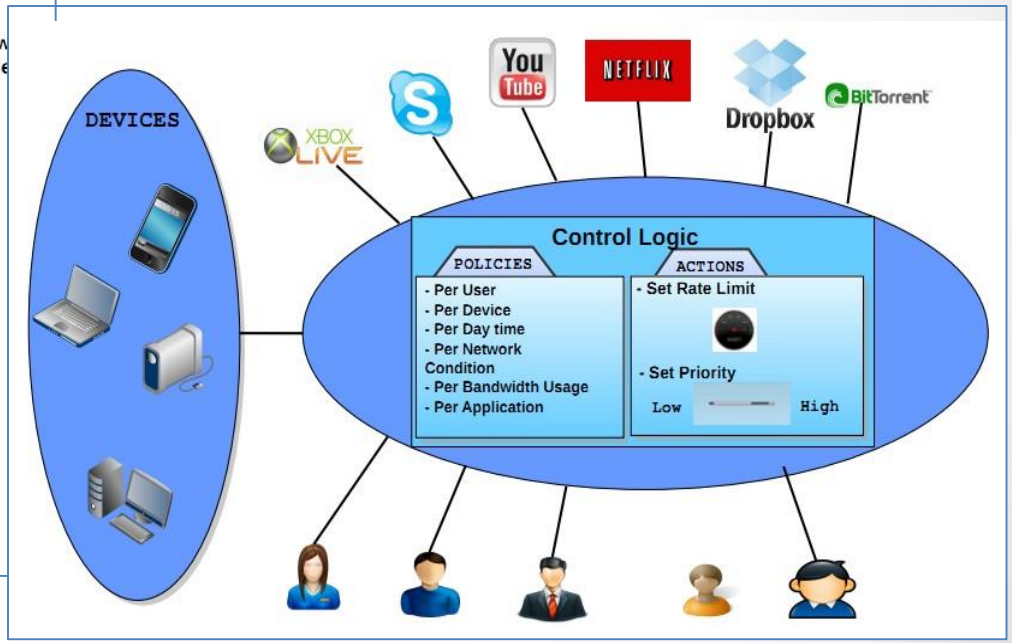


SDHN – abstractions



Connection visualization of home network devices

The controller can be located anywhere and provide the user with a clear graphical interface



Visual abstractions for devices, users and applications that allow you to conveniently describe flexible policies

Directions for further research (1)

OpenFlow v1.3, 1.4…:

- Innovative mechanisms to control what is happening on the network
- Monitoring and filtering
- Enforcing QoS Policies
- Ability to use IPv4 and IPv6

Directions for further research (2)

Cloud networks:

- Controller as a Service
- The ability to dynamically change policies in the network
- Traffic transmission through the controller in the cloud with the possibility of caching

Directions for further research (3)

IP routing:

- Optimizing routes
- Load balancing
- Automating router configuration and network topology
- Virtualization of network functions

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Thanks for your attention!

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