SDN을 활용한 IoT-Cloud Hub 기반 Multi-Access 및 다중 경로 제어

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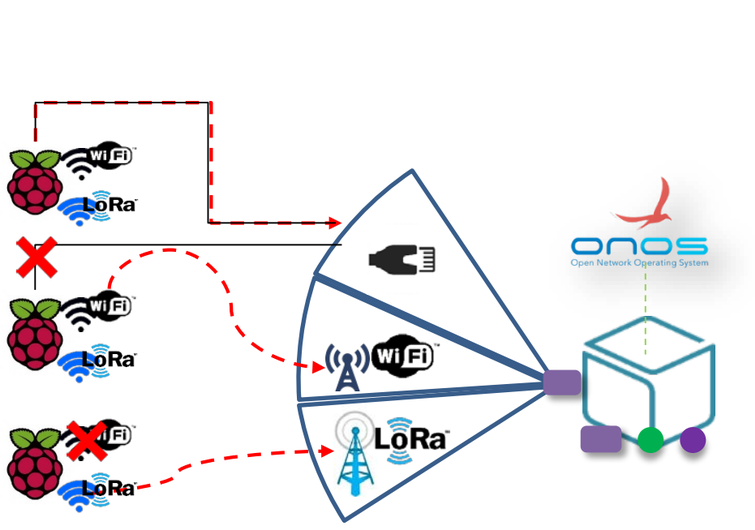
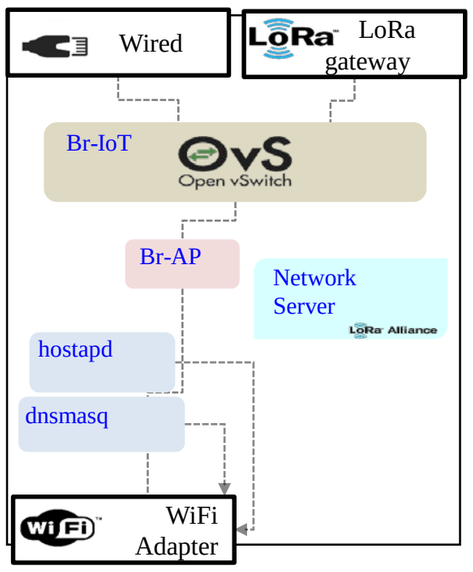
Type O+ Box: Prototype of Mini-server Switch for Multi-Access IoT Data Collection





SYS-E300-8D
- Intel Xeon-D Processor
- Super X10SDV-TP8F MotherBo
- 6 X 1G Eth, 2 X 10G Eth
- 2 X USB

AR9271 USB WiFi Adapter
- Atheros AR9271-AL1A chipset
- IEEE 802.11 PHY Modes: b,g,n

Kerlink LoRa IoT Station
- Bandwidth: 868MHz (EU Standard)
- Capacity: 8 Band
- Open Source support(Network Server)

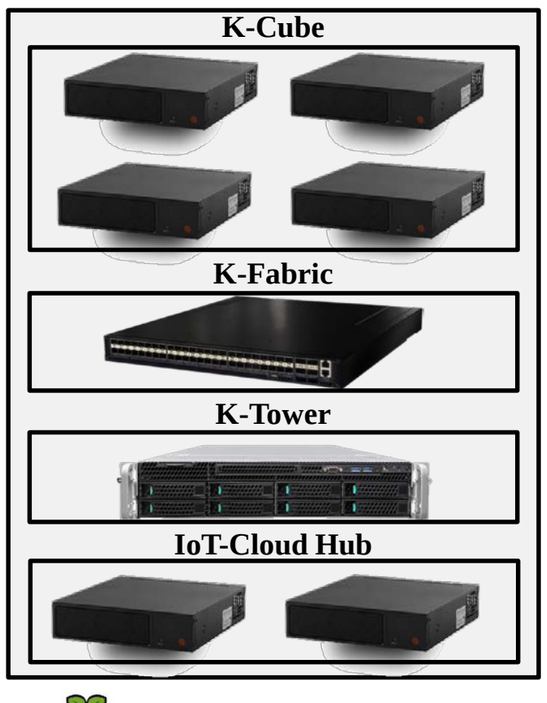
Type O+ Mini-Server Switch

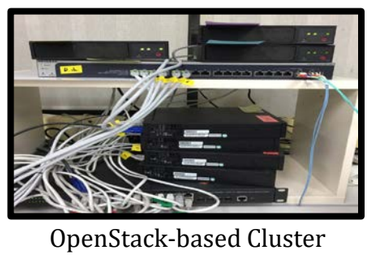
The Type O + Mini-Server Switch can accept data generated by IoT devices that transmit data using a wired Ethernet, Wifi or LoRa interface. And it is designed to process the received IoT data with the help of SDN so that the user can forward the desired data to the desired location.

Type O+ Internal network configuration

1) Wired Ethernet Interface is connected to the Open vSwitch bridge. And this bridge is connected to ONOS SDN Controller and receives its control.
2) Type O+ is act as AP by using dnsmasq(DHCP server) and hostapd daemon.
3) There is a bug where the WiFi connection does not recognize the password when the wireless interface is connected directly to the Open vSwitch. So we connected Linux bridge and patching between bridges.

Type O+ & K-Cluster: Multi-Access Edge Cloud





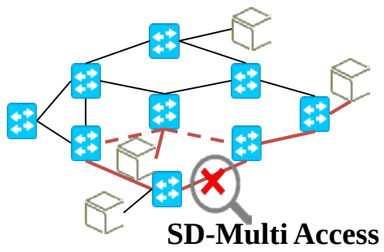
OpenStack-based Cluster

SDN enabled switches

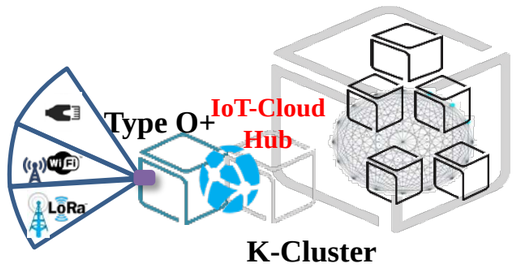
Type O+ Box with LoRa gateway

IoT End Devices

IoT End Device



SD-Multi Access

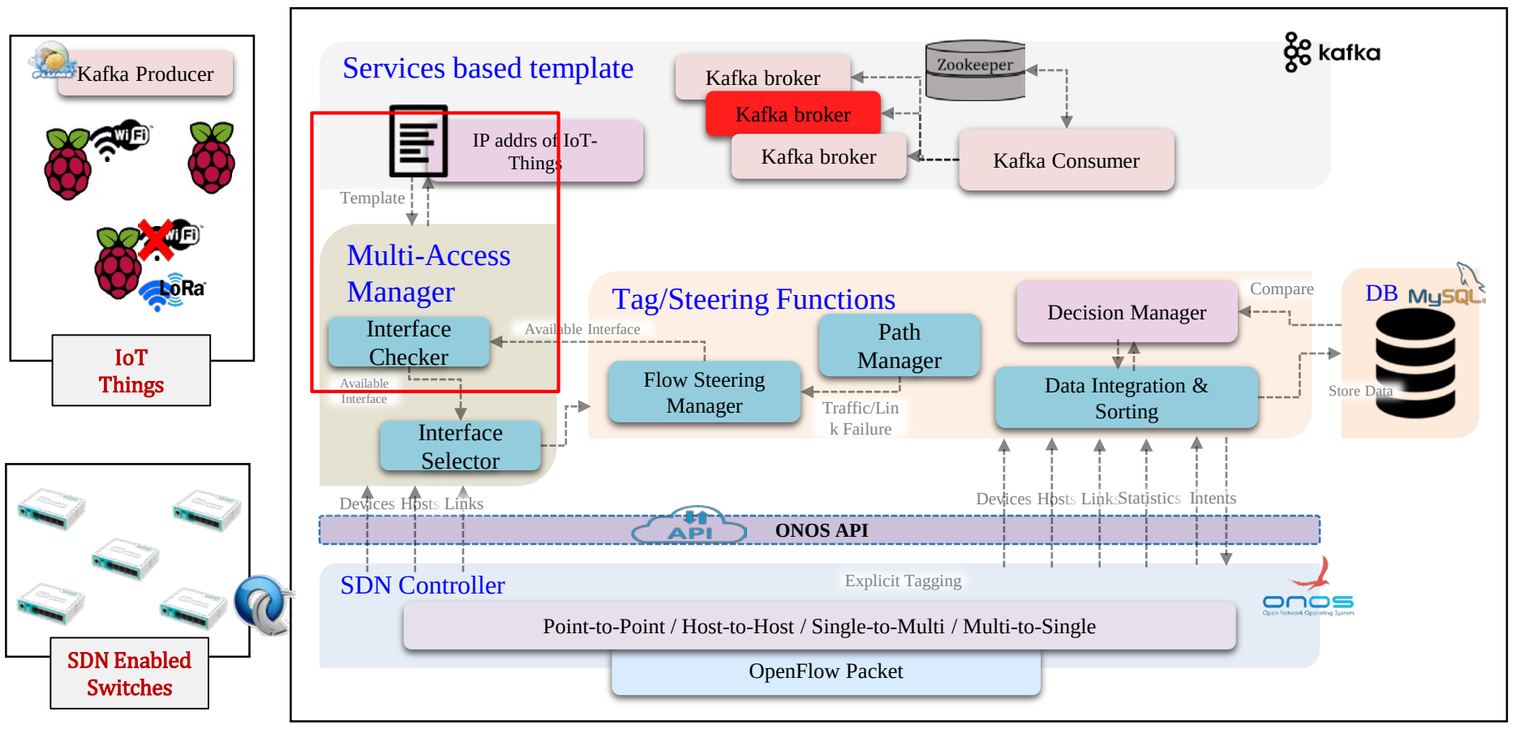


K-Cluster

Multi-Access Edge Cloud for Multi-Access and Multi-Path Demonstration

1) K-Cluster is an economical cluster model for SDN / NFV / Cloud demonstration developed as part of the K-ONE project.
2) Connect Type-O + Mini-Server Switch to K-Cluster to accommodate multi-access IoT data.
3) Creating a path for IoT devices to access the K-Cluster with SDN enabled Switch(MikroTik). This is defined as SD-Multi Access, and the multi-path control can be demonstrated in this area.
4) When an IoT device is connected using Wire Ethernet, WiFi and LoRa interface, it can select the interface to receive data with the help of SDN Controller.

IoT-Cloud Hub Framework for Multi-Access Multi-Path Steering



Multi-path, multi-access verification scheme

- IoT-Cloud Hub is a part of K-Cluster and acts as a bridge between IoT data and K-Cluster. It was developed to continuously collect IoT data using ONOS API.
- The main functions are a steering function for multipath control and a multi-access management function for controlling multi-access interface.
- Steering Function

✓ It was developed for stable operation of data path. It is possible to distribute traffic to multiple paths without crowded traffic on a specific path. If a disconnection is detected in the middle of the data path, it helps to bypass the corresponding traffic.

- Multi-Path Management Function

✓ For Future Work