

5G Mobile Platform with P4-enabled Network Slicing and MEC

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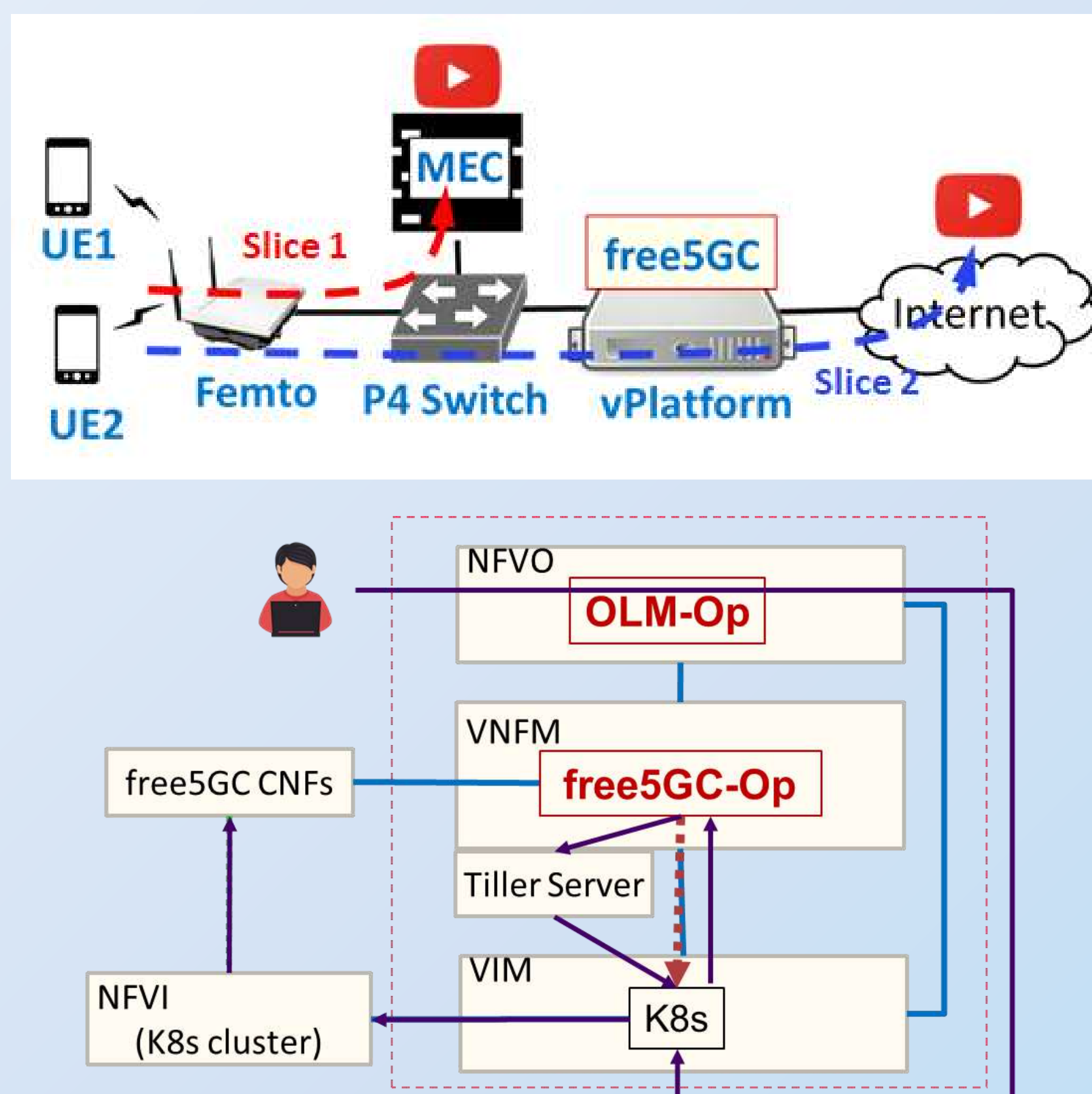
Abstract

This presentation introduces a 5G virtualization platform with P4-enabled network slicing and MEC services. The platform is a variant of the ONF M-CORD reference design. We first use an Ansible playbook to automatically build Kubernetes and configure Container Network Interfaces (CNIs) with Calico, Multus, and SR-IOV. After the instantiation of Kubernetes cluster, the platform uses RedHat Operator Framework to deploy 5G core network services, namely free5GC. The free5GC core network is compliant with the 3GPP Release 15 Service Based Architecture and is an open-source project hosted by National Chiao Tung University. However, the AMF and UPF modules of the free5GC have an S1 interface so that the free5GC can interwork with commercial 4th Generation Femtocells.

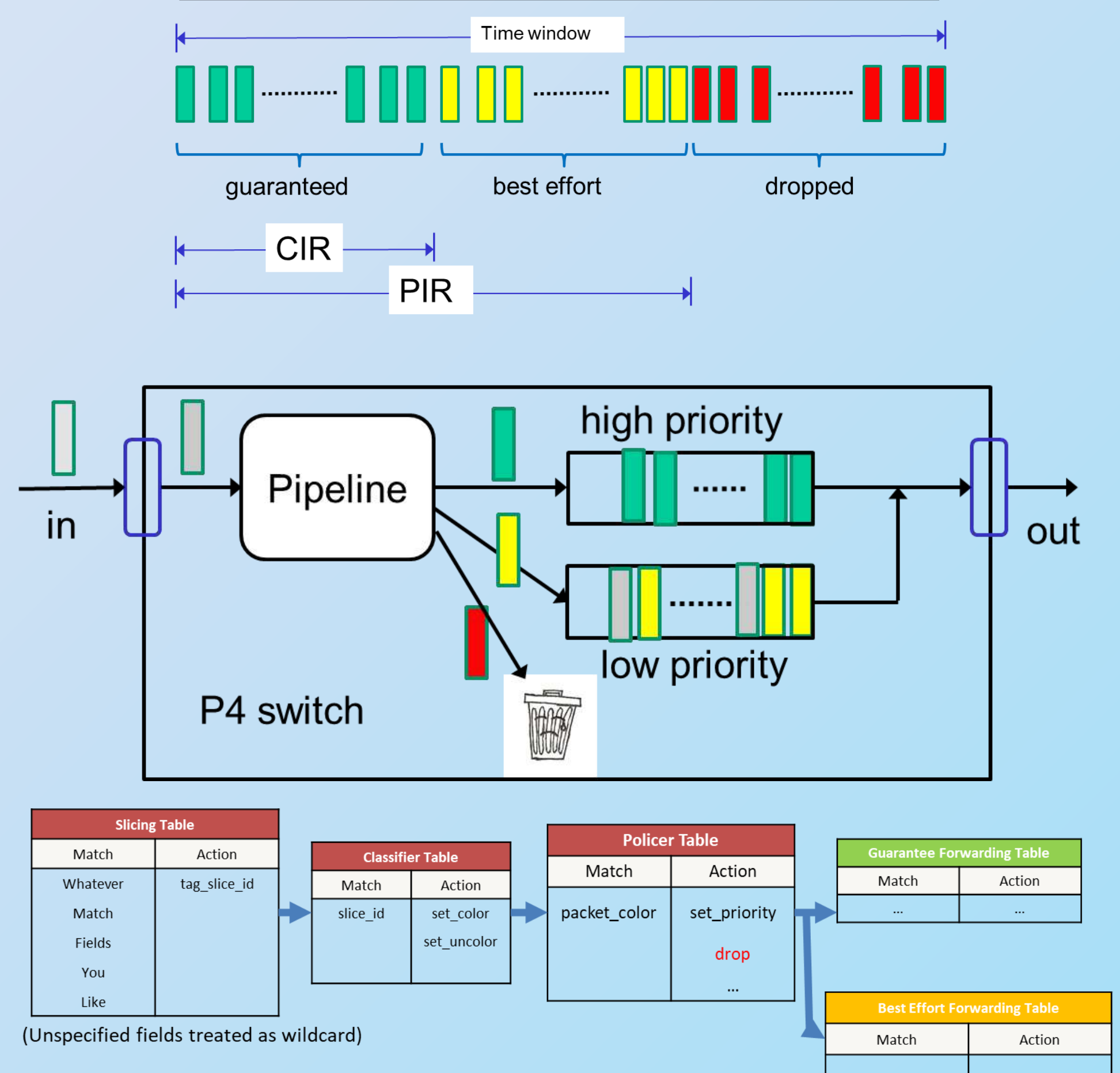
The components of free5GC, such as AMF, SMF, and UPF, are all containerized and running in the Pods monitored by Kubernetes. Furthermore, the platform also adopts Kubernetes CustomResourceDefinition (CRD) to deploy free5GC as a Custom Resource (CR) and a corresponding Custom Controller. The Controller then watches for the update requests for free5GC instances and manages free5GC instances on-request dynamically. We have also implemented GTP Tunnel encapsulation/decapsulation and bandwidth management mechanism in P4 switches to support service offloading for Mobile Edge Computing and bandwidth control for Network Slices with different QoS, respectively. Network Slice Selection Function (NSSF) can then select network slices with different bandwidth requirements for users or devices.

Keywords: 5G virtualization platform, P4-enabled network slicing, MEC

5G Lightweight NFV-MANO Mobile Platform



P4-enabled Network Slicing and MEC



Conclusion

Propose 5G Mobile Platform with P4-enabled Network Slicing and MEC

- Compliant with ETSI MANO
- NCTU free5GC
- Loading Reduction in MEC with P4 Switch
- P4-enabled network slicing