P53/79176/2015
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Service Awre Scheduling Policy for time Constrained communication in Network Functions Virtualization and Software Defined Network
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Communication services have varying quality of service (QoS) requirements which the network should provide for a service to meet desired objective or user expectations. When it comes to services with strict service levels requirements and timing constraints, the need to provide quality of service management and control becomes even more important. Software defined networks (SDN) and network functions virtualization (NFV) are modern approaches in network design that offers the environment in which this control can be realized and with flexibility, worth noting is that traditionally network quality has been measured by the degree of end user satisfaction. To ensure that the users' expectations were met, a lot of effort and resources were put into the design and development of network appliances, this was to ensure resiliency and reliability. With the advent of network functions virtualization, the network appliances are implemented in software run on commercial off the shelf servers, further in software defined network, the architecture is transformed with the control being separated from forwarding and the network becoming open and programmable. Even with this shift to new networking paradigms the end user expectations hardly change - the network must meet certain levels of quality required for various use cases. In this study we looked at the concepts surrounding software defined networks and network functions virtualization with a view to understanding some of the weaknesses and challenges experienced in realizing service quality, our study revealed that there is a relationship between network latency and throughput to topology, policy, congestion and the traffic nature. We developed an SDN prototype to represent the case of vehicle tracking system, in reality GPS (global positioning system) devices fitted in motor vehicles send data to an application server; this data is carried by a multiservice network thus prone to congestion and quality degradation. To alleviate the effect of this degradation for our GPS tracking use case, we proposed and implemented a traffic shaping and priority queuing policy to ensure that in the midst of network load occasioned by multiple services sharing network resources, the information flow from the GPS devices to application server is accorded highest priority treatment. The prototype was developed and tested in a virtual network comprising of Mininet hosts, Open vSwitch (OVS) and RYU software defined network controller. Results obtained from the experimental data showed that, despite the congestion created on the network our traffic of interest in-line with our policy was not affected. The conclusion we drew from our experiment was that the policy was adequate in providing the desired quality of service functionality for our use case.