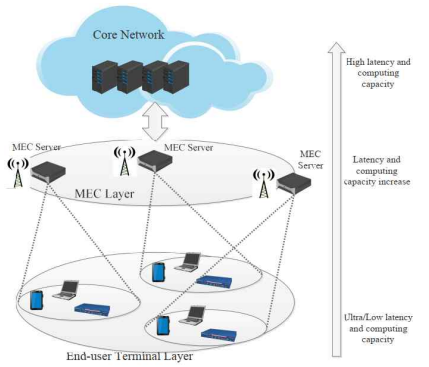
NFV-Based Mobile Edge Computing for Lowering Latency of 4K Video Streaming

Motivation

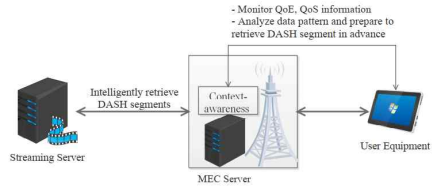
- ❖ Ultra-high quality video streaming is expected to be the standard for multimedia in the next decade. However, it poses many problems with the current internet transmission technologies, such as network latency, stalling while a video is playing back.
- ❖ In this article, we present another approach to improving ultra-high quality video streaming over the internet mainly focusing on mobile edge computing (MEC).

System Design

- ❖ Latency is increased as we go deeper into the network infrastructure.
- ❖ If MEC locates near user equipment (UE) and contains requested video from UE, it can provide the streaming high-quality efficiently, especially, 4K or ultra-high-quality streaming.
- ❖ MEC usually does not have video at the first request from UE.
- ❖ We need a context-awareness component placing in the MEC server. There have several reasons to implement the component in the MEC server.
  - ✓ UE commonly has a low computational capacity as well as battery lifetime.
  - ✓ The component requires statistic and data process with high computation. Last but not least, locating the component might assist other UEs which demands the same source video and reduces waste bandwidth.



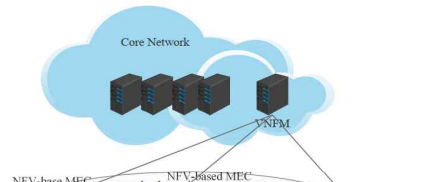
Overview of MEC video streaming delivery system



Content-awareness in the NFV-based MEC streaming system

Fuzzy-based Adaptive Streaming Method

- ❖ We consider each MEC server as a virtual network function (VNF) which is managed by a virtual network function manager (VNFM) locating in the core network.
- ❖ The method applies fuzzy logic to deduce the next request segment of DASH streaming.
  - ✓ We considers 2 input parameters which are bandwidth, buffer value at the client side.
  - ✓ We first employs moving average technique to reduce statistical fluctuation value in a period.
  - ✓ We applies the entropy method to deduce a number of trace-back steps (the measurement point referring back from the current).



NFV-based MEC system

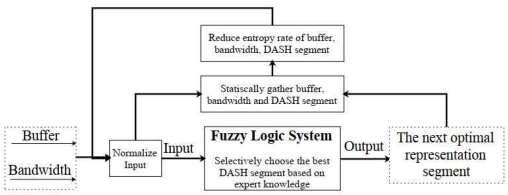
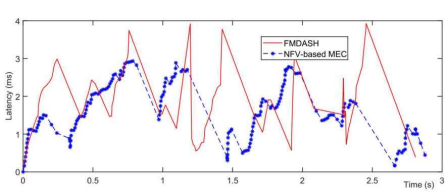
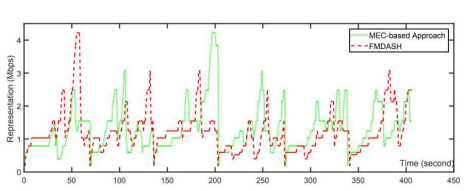


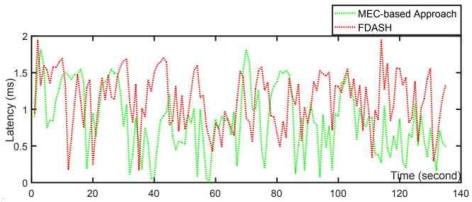
Illustration of fuzzy-based adaptive streaming method

Experiment

- ❖ NFV-based system got lower latency around 10% compared to traditional approach core network client driven based.
- ❖ MEC-based approach utilizes network resource which is bandwidth more efficiency compared to FMDASH up to 6.3%.
- ❖ The latency of our approach is statically less than 26% compared to FDASH which is the base method in this research.







전남대학교 CHONNAM NATIONAL UNIVERSITY

S. M. M. C Smart Mobile Media Computing Lab.