A Viable Upload Acceleration Service for Mobile Devices

Yan Pu, Akihiro Nakao
Graduate School of Interdisciplinary Information Studies
The University of Tokyo

Background

Proliferating Mobile Devices and WiFi Access Points
• Nowadays, many popular cloud computing applications and services (e.g., Facebook, Youtube, etc.) on mobile devices post User-Generated-Content (UGC) to data center via wireless network connections.
• Cache aids downloading large contents, but no acceleration mechanism for uploading today.
• Mobile devices today depend heavily on WiFi access points for first/last mile to the Internet.
• Designing a service framework for accelerating upload for WiFi access points.

Prototype

Videos and Photos Upload Web Service with iOS Client
• Demo web service has a two-tier structure where the front-end is deployed on our host-based WiFi AP for acceleration.
• Mobile device takes and uploads videos and photos.
• Front-end service quickly closes connection after data has been received and starts posting data to backend service immediately.

Architecture

Two Main Factors: Virtualized WiFi Access Point and First Mile Network Slicing

Wireless Extension by Virtualized WiFi Access Point
• Multiple VMs are hosted in AP and connected with Open vSwitch.
• Traffic is selectively redirected to a target VM.
• Flows are temporarily stored at the VM and forwarded to backend server.
• Transmission can be done quickly due to high throughput between clients and WiFi Access Point.

First Mile Network Slicing
• We enable first mile computation by network virtualization.
• Our two-tier service is deployed on a virtual network infrastructure enabled by our previous work. [1,3]
• Migration of the front-end and/or backend VM with acceleration service is also possible.
• Our framework can be embedded to the existing web services easily.
• Our framework extends Infrastructure as a Service (IaaS) with WiFi APs.

Experiment & Conclusion

Experiment Setup
• We upload videos of different length and record upload time with our prototype and repeat for five times.
• We show upload time as bars and the deviation of upload time as error bars in Figure 4.

Conclusion
• We propose a viable upload acceleration service.
• Prototype implementation-based experiments show that upload time is considerably reduced by this acceleration service.
• Stable throughput is achieved during upload.
• Our service takes advantage of our previous work of virtual infrastructure service by extending it with virtualized WiFi AP.