A Viable Upload Acceleration Service for Mobile Devices

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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.

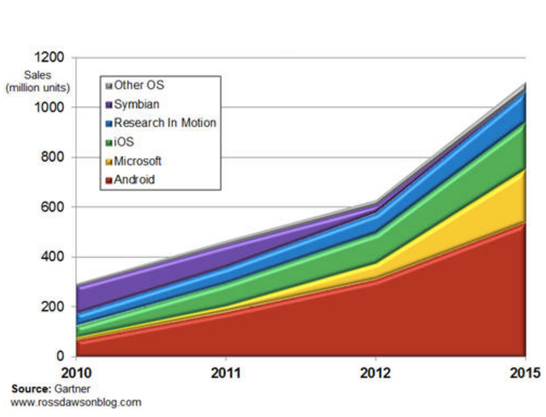


Figure 1.Global Smartphone Sales

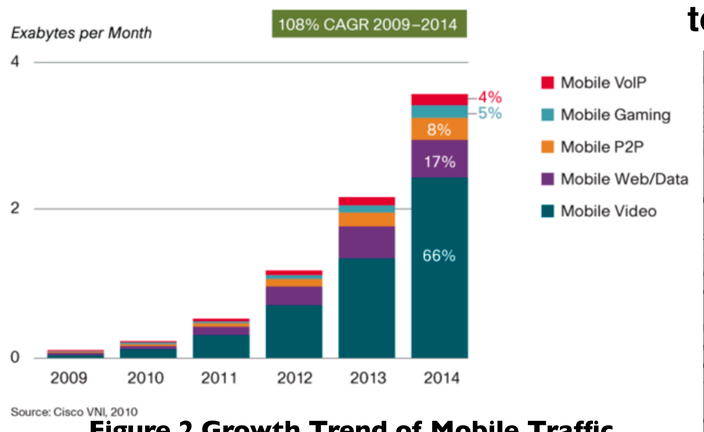


Figure 2.Growth Trend of Mobile Traffic

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.

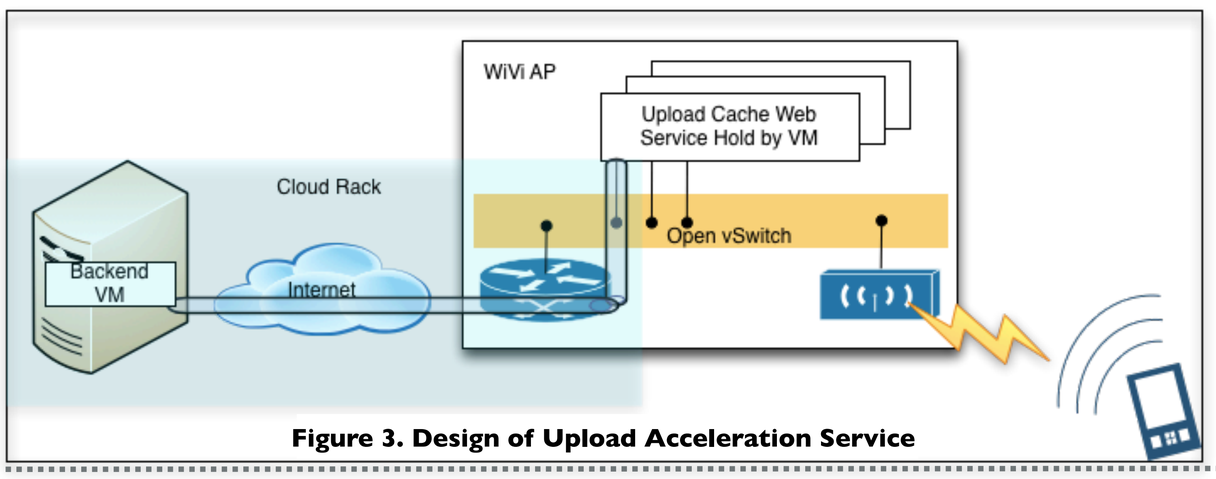
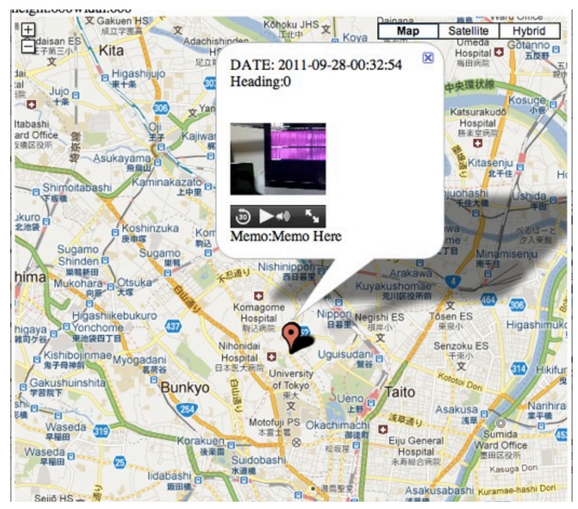


Figure 3. Design of Upload Acceleration Service

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.



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.

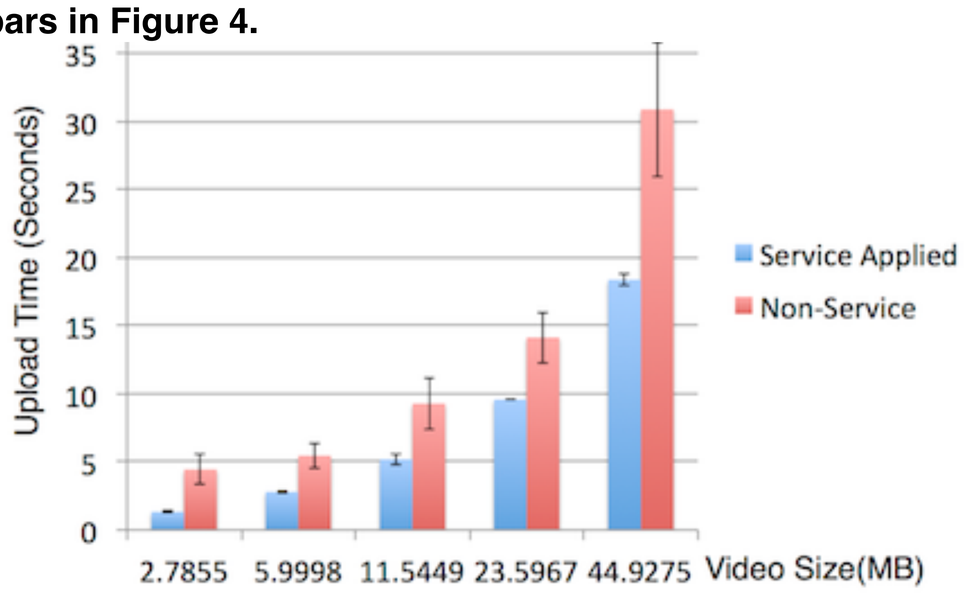


Figure 4. Upload Time for Different Length Videos

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.

References

- 1. P. Yan and et al. Cloud rack: Enhanced virtual topology migration approach with open vswitch. In Information Networking (ICOIN), 2011 International Conference on, jan. 2011.
- 2. B. Pfa and et al. e.a.: Extending networking into the virtualization layer. In In: 8th ACM Workshop on Hot Topics inNetworks (HotNets-VIII).New YorkCity,NY(October 2009.
- 3. R. Potter and et al. Mobitopolo: a portable infrastructure to facilitate exible deployment and migration of distributed applications with virtual topologies. VISA '09, New York, NY, USA, 2009. ACM.