Mobile Traffic Compression Methods

Themistoklis Melissaris (Princeton), Margaret Martonosi (Princeton)

Growth of Mobile Traffic

- Mobile traffic grew 67% in 2014, overtaking other network traffic and is expected to increase nearly tenfold between 2014 and 2019
- Increasing desire for security in mobile apps/websites => encryption
  - 30% of Internet traffic is encrypted, expected to double by the end of 2016
  - But, encryption adds power/performance overhead.
  - And, Encrypted mobile traffic has high entropy: hard to compress.

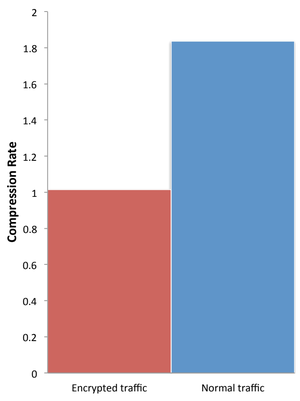
Our Approach (Work in Progress)

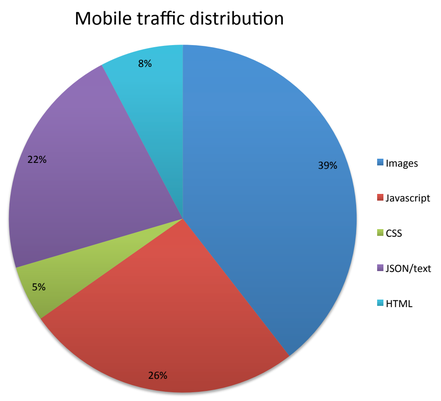
- As mobile traffic continues to increase there is a need to
  - Reduce uplink/downlink traffic size and cost
  - Provide tools to automatically utilize compression
- Handle encrypted mobile traffic efficiently
- Balance compression with changing signal/battery states
  - Opportunity to save on power consuming data transmission and reception
  - Refrain from compressing when unnecessary

Mobile Traffic Measurements

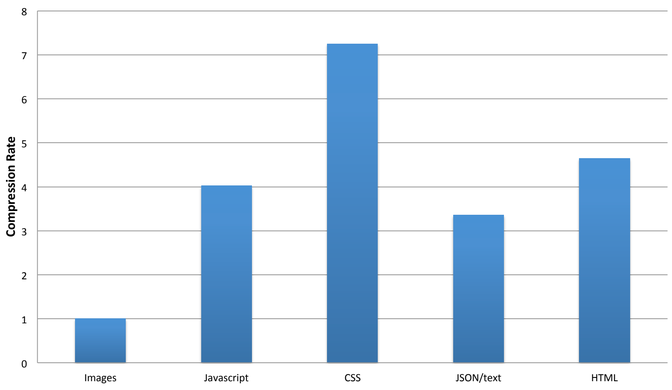
Measurement Methodology

- Understanding the composition of mobile traffic is necessary
  - Images, video and audio appear in different compressed formats and offer low compression rate.
  - Scripts and JSON/text formats exhibit very high compression rate
  - Encrypted traffic leaves practically no room for compression
- Packet traces are collected by a traffic analyzer functioning as a proxy; a trusted certificate on the proxy is used to decrypt encrypted traffic. Non multimedia apps were used.





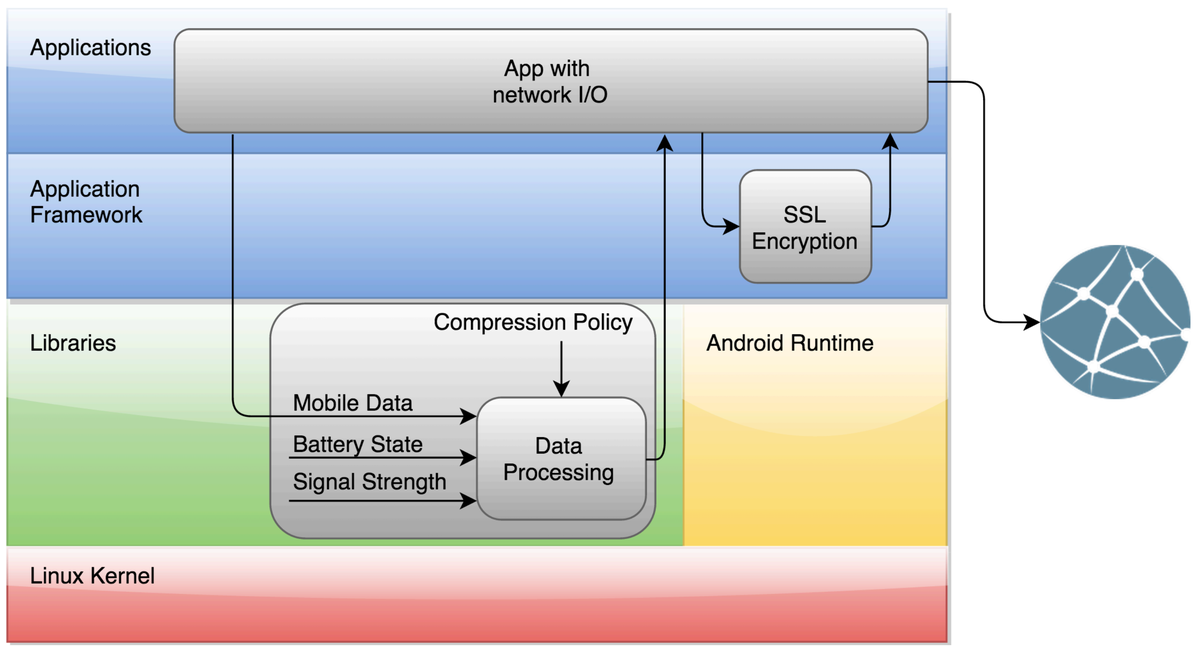
- Compression measurements in both a static and dynamic environment provide a lot of insight
  - Indicate the effect on performance, power efficiency, additional network latency
  - Demonstrate the dependency on signal strength and battery state



Choosing compression policies

Adaptive Compression Overview

- Compression decisions can be made using signal strength, battery state and mobile data information
  - Edge connectivity requires bringing data size to its bare minimum
  - Transmitting data while low on battery causes the phone's processor to transition from low to high energy state with additional energy footprint
  - Scripts and JSON/text can reduce their size significantly
  - Lossy image compression can be used to reduce data size



- Provide library for applications to automatically adjust compression to signal availability and battery level
- Guarantee that encryption follows compression

Conclusion

- Understanding mobile traffic better can lead to faster and more power efficient mobile communication
- Adaptive compression can balance communication with compression overhead to significantly reduce wasted energy consumption and improve performance

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