Understanding Smartphone Usage
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Motivation: How do people use their smartphones?

Many basic facts on smartphone usage are unknown: 
1. How often does a user interact with the phone? How long is 
each interaction?
2. How many applications does a user run and how is her 
attention spread across them?
3. How much network traffic is generated?
4. What limits network performance on smartphones?

Why do these questions matter?
1. Assessing effectiveness of existing mechanisms to save 
ergy and improve performance
2. Proposing new resource management mechanisms based on 
better understanding of usage
3. Guiding future smartphone hardware/software design

Datasets: Measured on the phones

Dataset1:  
- 33 Android users with unlimited voice, 
text, and data plans 
- Recorded screen events, call events, 
application interaction times, 
application network traffic 
- 7-21 weeks of data per user (9 weeks average)

Dataset2:  
- 222 Windows Mobile users with voice and unlimited data 
- Start and end time of application 
invocations were recorded 
- 8-22 weeks of data per users (16 weeks average)

Dataset3:  
- 8 Windows Mobile and 2 Android users with unlimited voice and data plans 
- Packet level traces, including link layer 
headers were logged 
- 4-12 weeks of data per user (7 weeks average)

Diversity: Quantitative diversity among users

Interactions and resource consumption:  
- Significant diversity in interaction and resource consumption

Applications:  
- Close to 90% of sessions include only one application.

Smartphones are primarily communication devices

Network performance  
- Most of the transfers are small therefore overhead of lower layer protocols is significant

Towards Modeling Usage: Qualitative similarities among users

- A mixture of Exponential and shifted Pareto distributions explains
  session lengths

  \[ r \cdot \text{Exp}(\lambda) + (1-r) \cdot \text{Pareto}(x_m, \alpha) \]