One week in the life of the iPhone’s internet traffic

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Outline

- Problem
  - Initial situation
  - set of problems
- Study
  - Ways to capture data
  - Analysis
- Results
  - Technical characteristics
  - Found content
- Conclusions
  - Potential risks
  - Related work
Initial Situation

- High and fast growing demand for mobile internet

- N. Wood.: "Mobile data traffic growth 10 times faster than fixed over next five years.", 2009

- Mobile data will increase by 300 times

- New technologies and software offer more possibilities
Problems and Risks

• Threats to personal privacy:
  • direct personal data
    • Name, birthday
  • interpersonal data
    • email, address book
  • location based data
    • current / visited location(s)

• New threats with every new development
  • more information is stored
  • different kind of information
    • (i.e.: no information about surrounding area without localization with GPS module)

• Risks increase due to increased amount of data
Motivation

- Daily usage of smartphones and mobile devices
- What are the characteristics of mobile data?
- Is my data secure?
- Can anyone get personal information when capturing the traffic of my smartphone?
Related Work

- More representative study:
  - 2 datasets from 10 and 22 users, 532 days of data
  - Guideline for interesting aspects to search for
  - Provision of reference values

- Study focussed on the users:
  - Rich Ling and Pal Roe Sundsoy, "The iPhone and mobile access to the internet", 2009
  - Usage of iPhone compared to other smartphones
  - Showing the strong usage of the iPhone
Capturing Data

- tcpdump
  - + most detailed dump
  - - jailbreak necessary
- wifi network sniffer
  - - restricted motion
  - - 3rd party devices
  - - build-up time of connection
- VPN server
  - + no jailbreak necessary
  - + unrestricted usage
  - - build-up time of connection

- Analysis: Wireshark (former name Etheral)
Results (1)
Traffic Use by Application

- 14,32 MB in traffic
- top 7 apps produce 86% of traffic
- video stream takes up 66%
Strong varying packet sizes
small packets outgoing (queries)
large packets incoming (data)
Very large overhead (46.32% out, 2.27% in)
Results (3)
Performance

- Throughput (average)
  - 1.4 KB/s outgoing
  - 21.6 KB/s incoming
  - Very little compared to hard-line traffic or WLAN

- Traffic composition:
  - 99.73% TCP
  - 0.27% UDP

- Loss rate: 2.86%

<table>
<thead>
<tr>
<th>Loss</th>
<th>Excellent</th>
<th>Good</th>
<th>Acceptable</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.1%</td>
<td></td>
<td>0.1% - 1%</td>
<td>1% - 2.5%</td>
<td>2.5% - 5%</td>
<td>5% - 12%</td>
<td>&gt; 12%</td>
</tr>
</tbody>
</table>

- Categorized quality ranges
  - (Source: ICFA SCIC Network Monitoring Report, 2010)
Results (3)
Performance (2): RTT

- Round-Trip-Time Graph
- Timespan between sending and acknowledgement
- Concentration between 100 and 250 ms
- Some strong spikes
• Very sensitive data is transmitted via SSL stream
  • (Mail, Calendar, address book entries)

• Found personal data:
  • <query type="getforecastbylocationid"><list>
    <id>GMXX0007|638242</id>
    <id>USNY0996|2459115</id>
  </list></query>

• Location code for saved weather feeds

• Transmitted in plain text
Personal Threat

- Diffuse movement profile

- No direct thread
  - places manually added
  - no current location

- But threat to personal data
  - places of interest
  - most likely hometown or area nearby saved
Conclusion

- **Technical:**
  - strong difference to hard-line traffic
    - high overhead
    - significant loss rate

- **Personal privacy:**
  - Existing threat to personal privacy
  - Danger of new uprising risks

- **Significance of this study**
  - random sample of data
  - may not be representative compared to larger datasets
Sources

• H. Falaki, D. Lymberopoulos, R. Mahajan, S. Kandula and D. Estrin: "A first look at Traffic on Smartphones", IMC November 2010

• Rich Ling and Pal Roe Sundsoy, "The iPhone and mobile access to the internet", Chicago, Illinois, USA, May 2009

• January 2010 Report of the ICFA-SCIC Monitoring Working Group

• [http://de.wikipedia.org/wiki/Paketumlaufzeit](http://de.wikipedia.org/wiki/Paketumlaufzeit) (RTT Table)