Telematics
Computer Systems

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

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- 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

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Dienstag, 28. Juni 2011

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 sorrounding area without localozation with GPS module)

- Risks increase due to increased amount of data

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- 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?

- More representative study:
  - H. Falaki, D. Lymberopoulos, R. Mahajan, S. Kandula and D. Estrin: **"A first look at Traffic on Smartphones",** IMC 2010

  - 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

- tcpdump
  - + most detailed dump
  - - jailbreak necessary
- wifi network sniffer
  - - resticted motion
  - - 3rd party devices
  - - build-up time of connection
- VPN server
  - + no jailbreak necessary
  - + unrestricted usage
  - - build-up time of connection
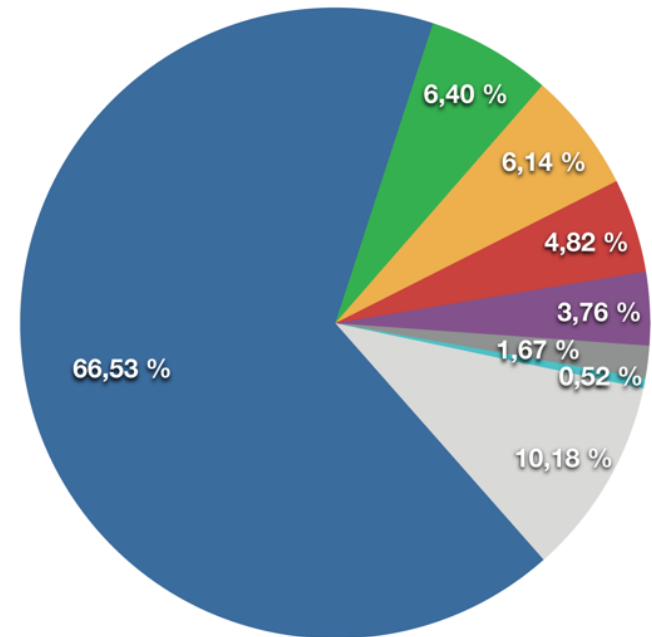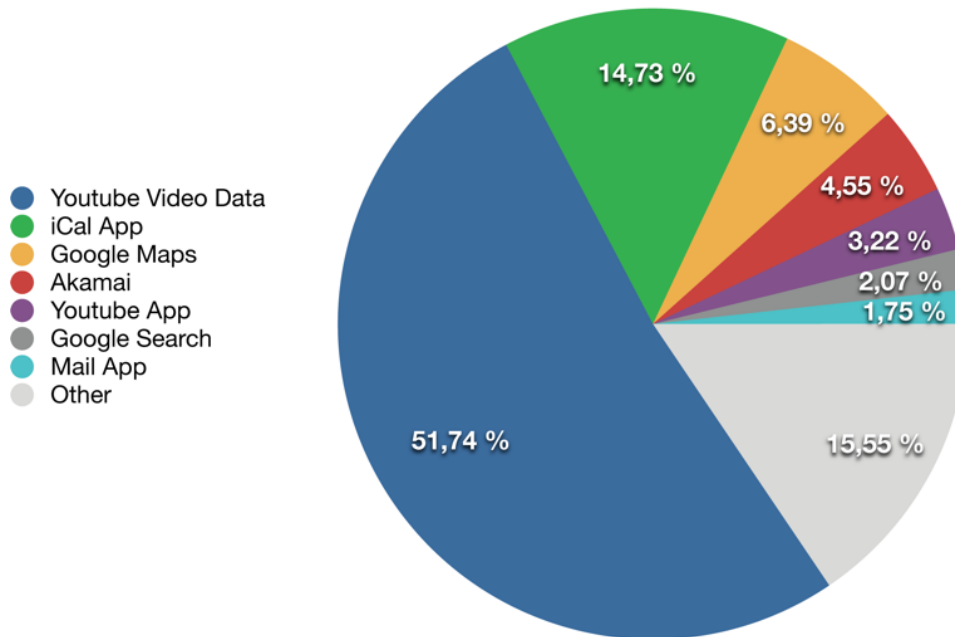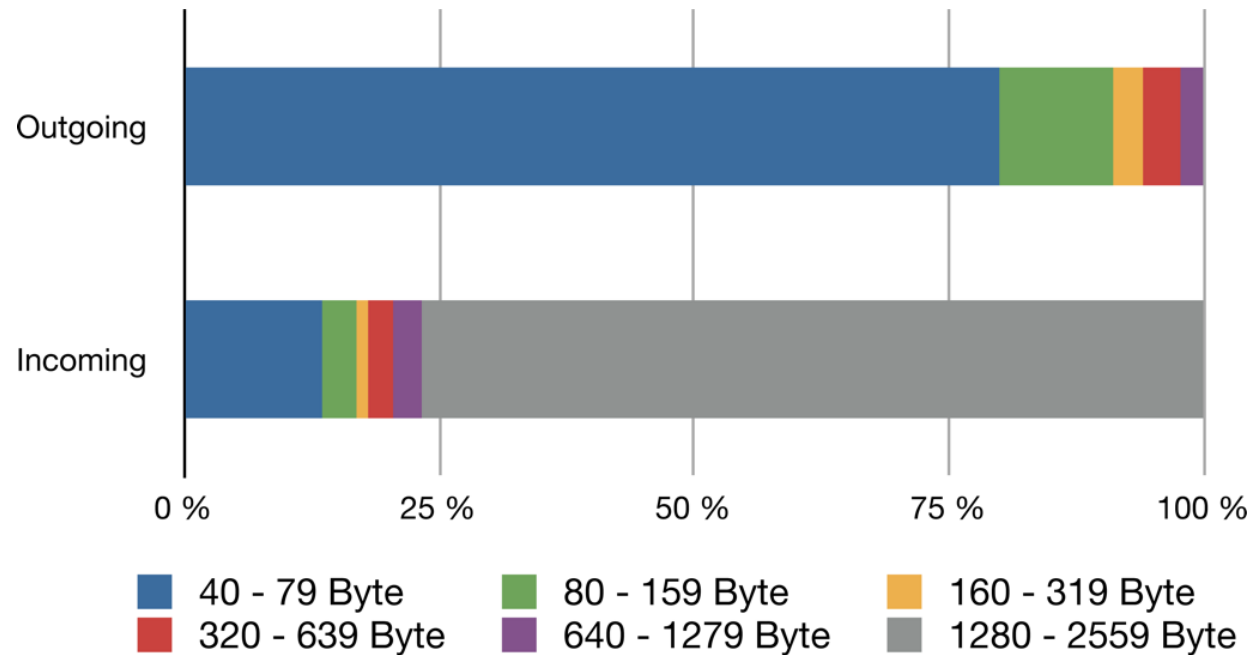
- Analysis: Wireshark (former name Etheral)

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Traffic use by application (packets)

Traffic use by application (bytes)

Legend:
- Youtube Video Data
- iCal App
- Google Maps
- Akamai
- Youtube App
- Google Search
- Mail App
- Other

Packets pie chart values:
- 51,74 %
- 14,73 %
- 6,39 %
- 4,55 %
- 3,22 %
- 2,07 %
- 1,75 %
- 15,55 %

Bytes pie chart values:
- 66,53 %
- 6,40 %
- 6,14 %
- 4,82 %
- 3,76 %
- 1,67 %
- 0,52 %
- 10,18 %

- 14,32 MB in traffic

- top 7 apps produce 86% of traffic

- video stream takes up 66%

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- Strong varying packet sizes
- small packets outgoing (queries)
- large packets incoming (data)
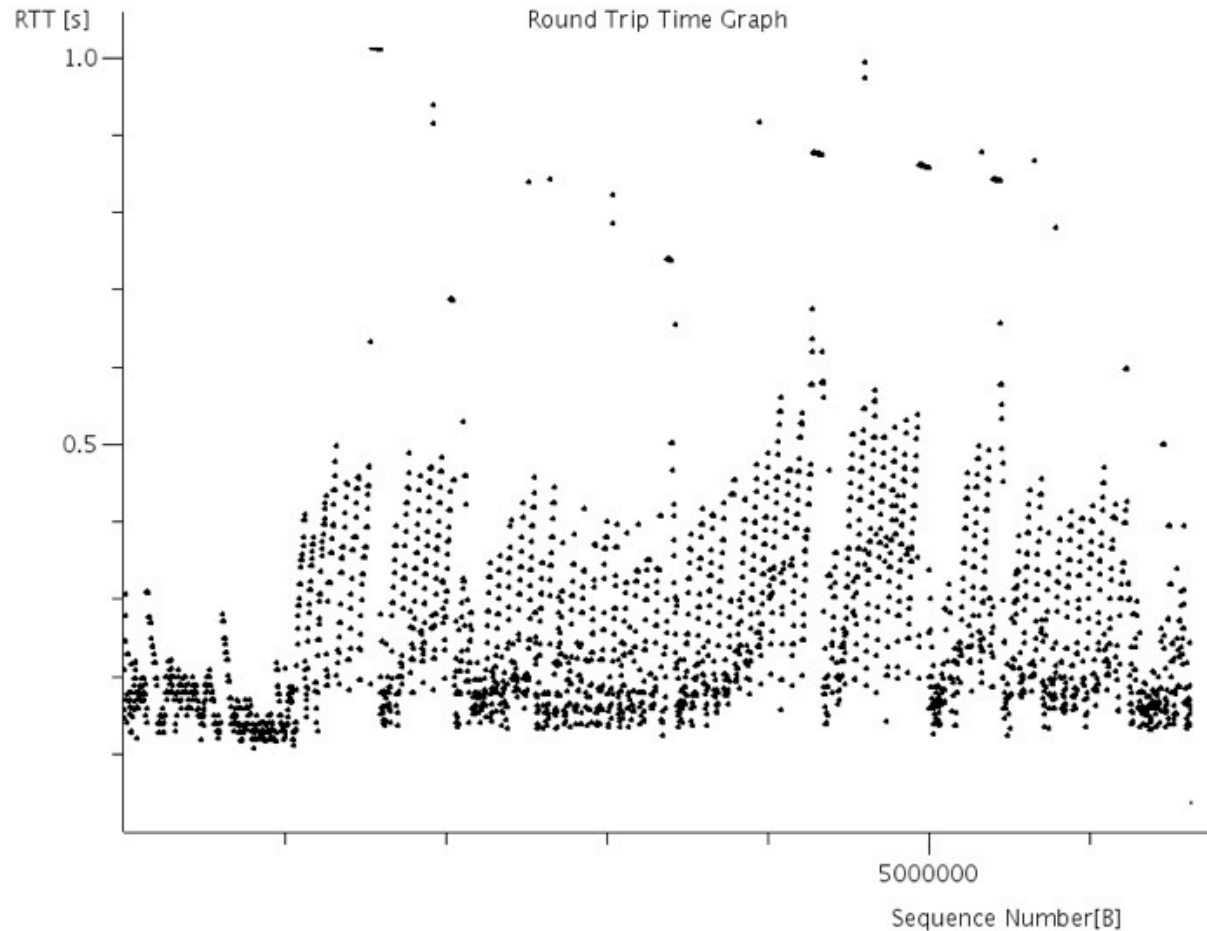- Very large overhead (46.32% out, 2.27% in)

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- 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%

	Excellent	Good	Acceptable	Poor	Very Poor	Bad
Loss	< 0.1%	0.1% - 1%	1% - 2.5%	2.5% - 5%	5% - 12%	> 12%

- Categorized quality ranges
- *(Source: ICFA SCIC Network Monitoring Report, 2010)*

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- Round-Trip-Time Graph

- Timespan between sending and acknowledgement

- concentration between 100 and 250 ms

- some strong spikes

Round Trip Time Graph

RTT [s]

1.0

0.5

5000000

Sequence Number[B]

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- 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

- 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

- 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 (RTT Table)

- N. Wood.: **"Mobile data traffic growth 10 times faster than fixed over next five years."**, 2009
  http://www.totaltele.com/view.aspx?ID=448681