Measuring the Mobile Internet

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with U. Michigan, USC, Google, INRIA, and many others

Motivation

Most of the time people spend online is via a mobile device*

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When YouTube hangs, is it

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- Weak signal?
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Key challenge: We need extensive network measurements to perform root cause analysis

There's an app for that

Solution: App-based measurement

- Speedometer
- Mobiperf

- MySpeedTest
- Netalyzr Mobile
- Namehelp Mobile
- …

How is this working out for us?

Lessons learned from mobile measurement

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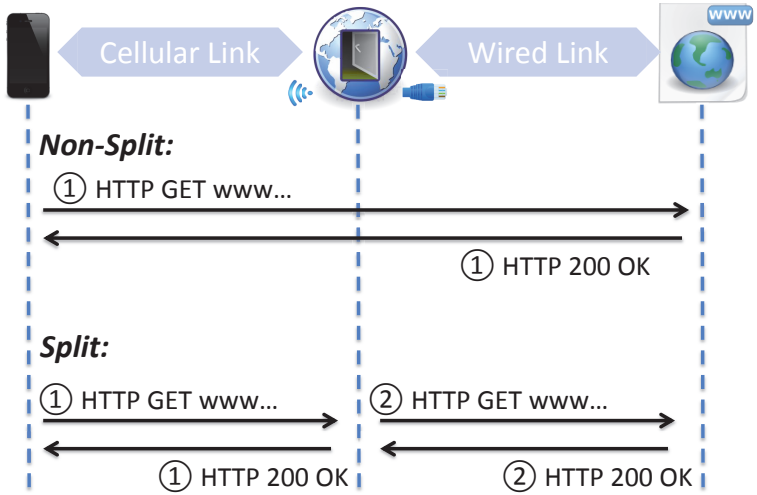

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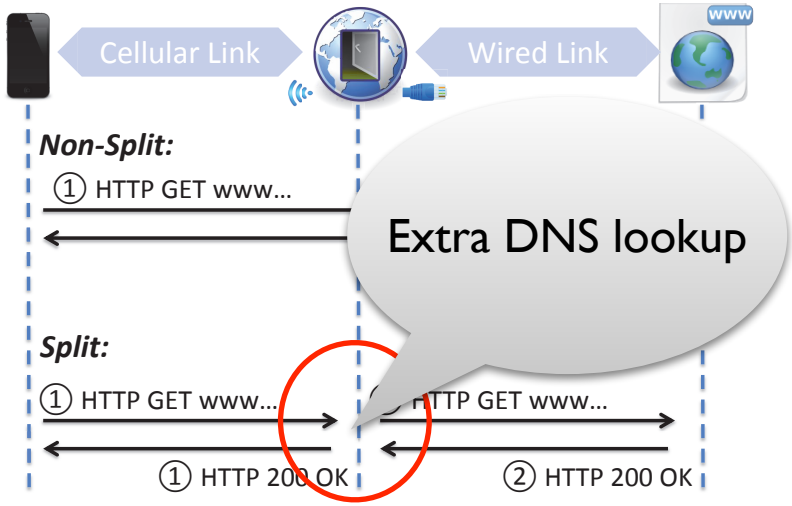

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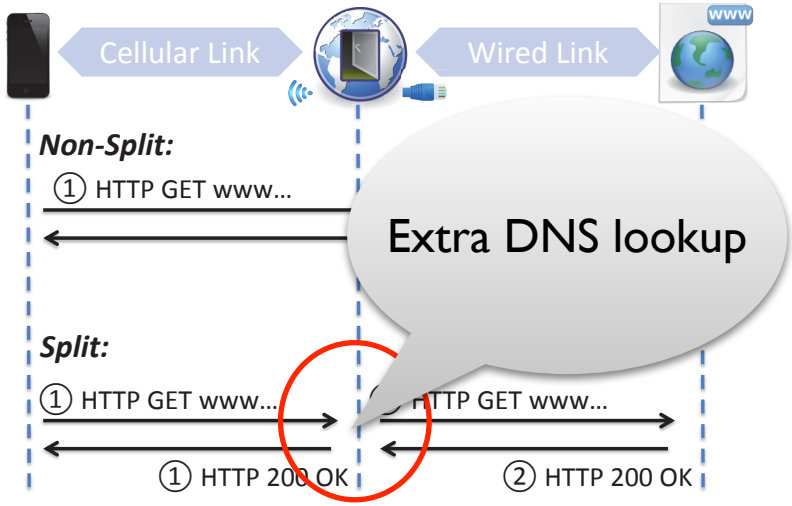
  - See Xing's poster for more info



Lessons learned from mobile measurement

- Spray and pray measurement can get you breadth…

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# of Measurements	439K	2326K	563K	506K	58K	1460K	2183K	301K	68K
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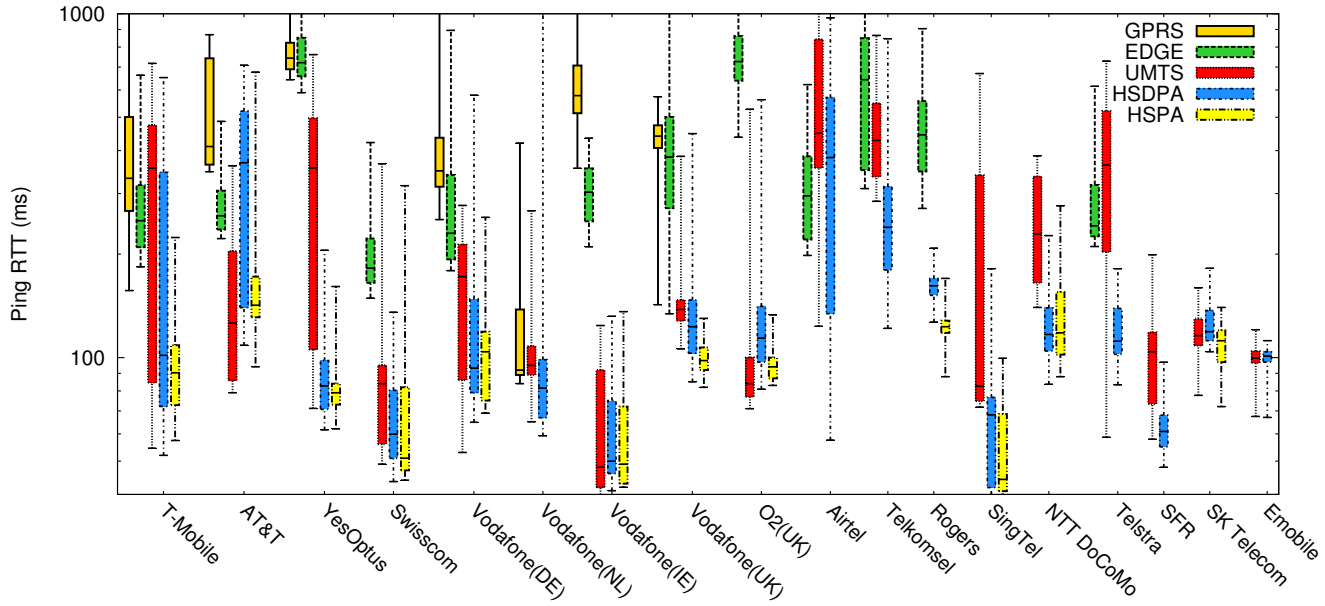
- …but noise in the data frustrates characterization



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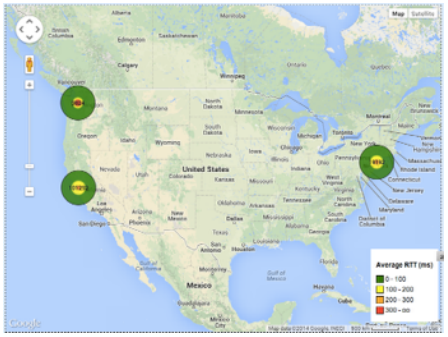

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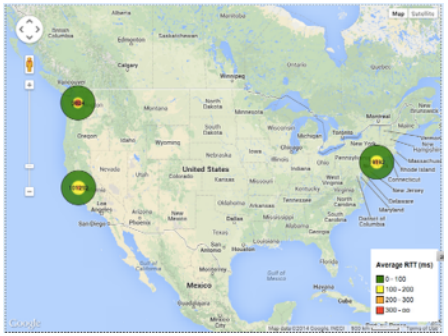
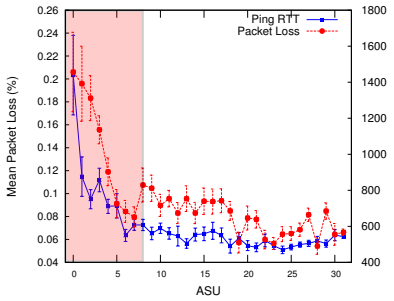


Example: Shotgun correlations

- Vary signal strength only, observe impact on performance
- Doesn't really generalize to factors such as location



Next generation of mobile measurement

Our 1st-generation apps have been useful!

Making further strides in this domain

- Needs a large(r) set of participating devices
- Real-time monitoring of performance
- On-demand (adaptive) measurements for RCA

Great, let's all go build new apps!

Pitfalls of App Proliferation

Coverage

- Who has a billion-install idea? Million-install?
  - If so, what the heck are you doing here?

Consistency

- How do we join datasets?
- What measurement implementations?

Cost

- How many times do we need to run the same ping?

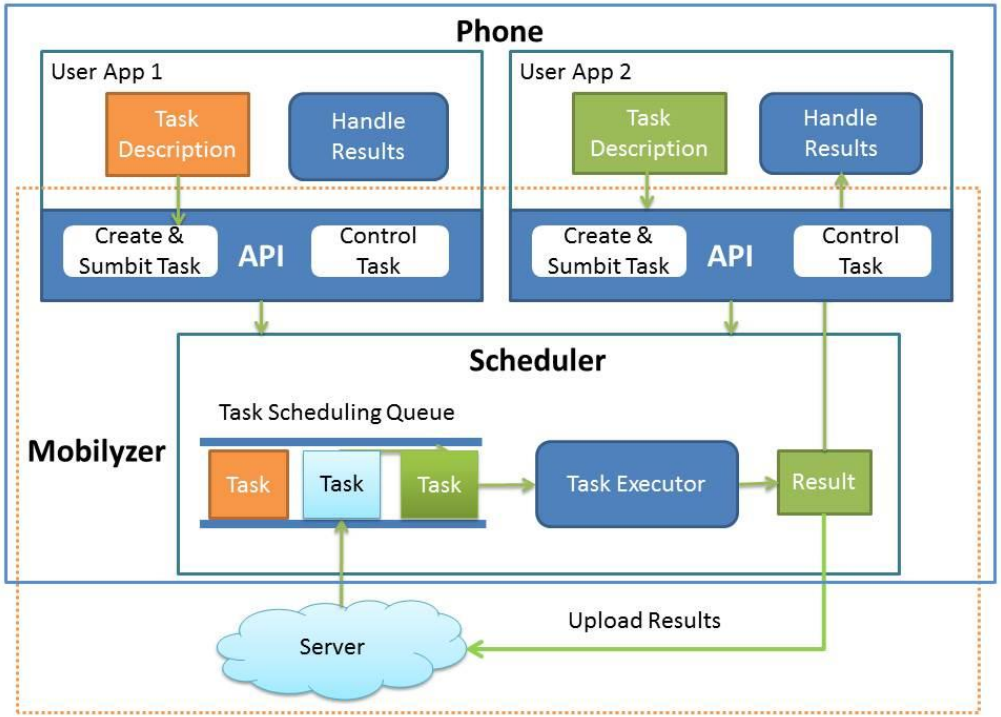
Interference

- What if MST runs during Mobiperf's ping test?

Mobilyzer: Mobile Measurement Library

Our proposal: One measurement library, many apps

- API for measurements simplifies app dev



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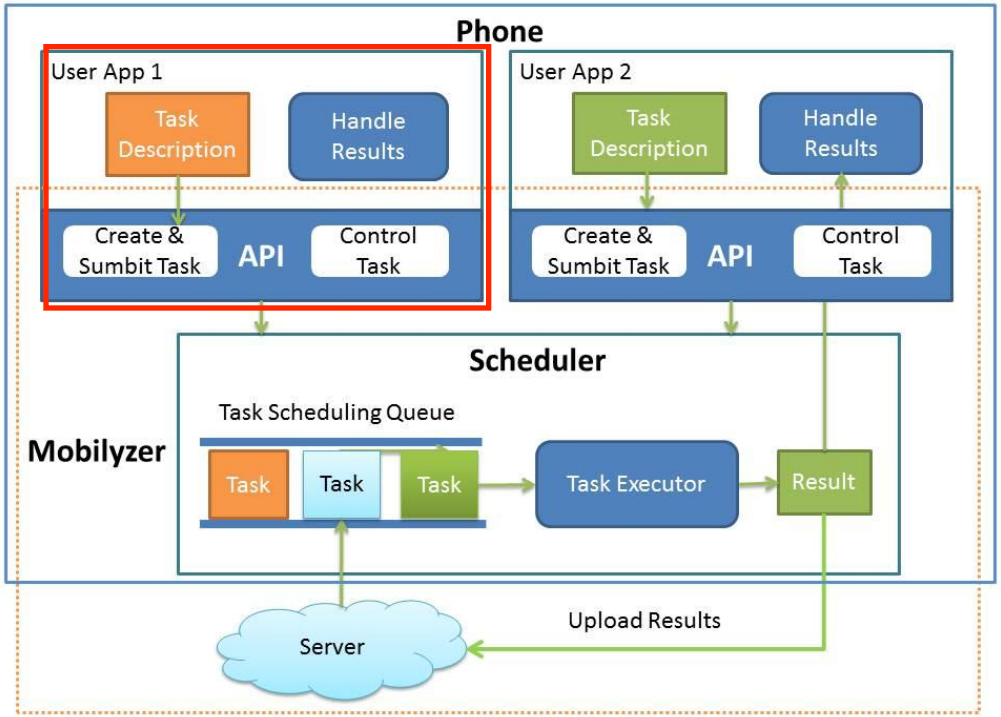

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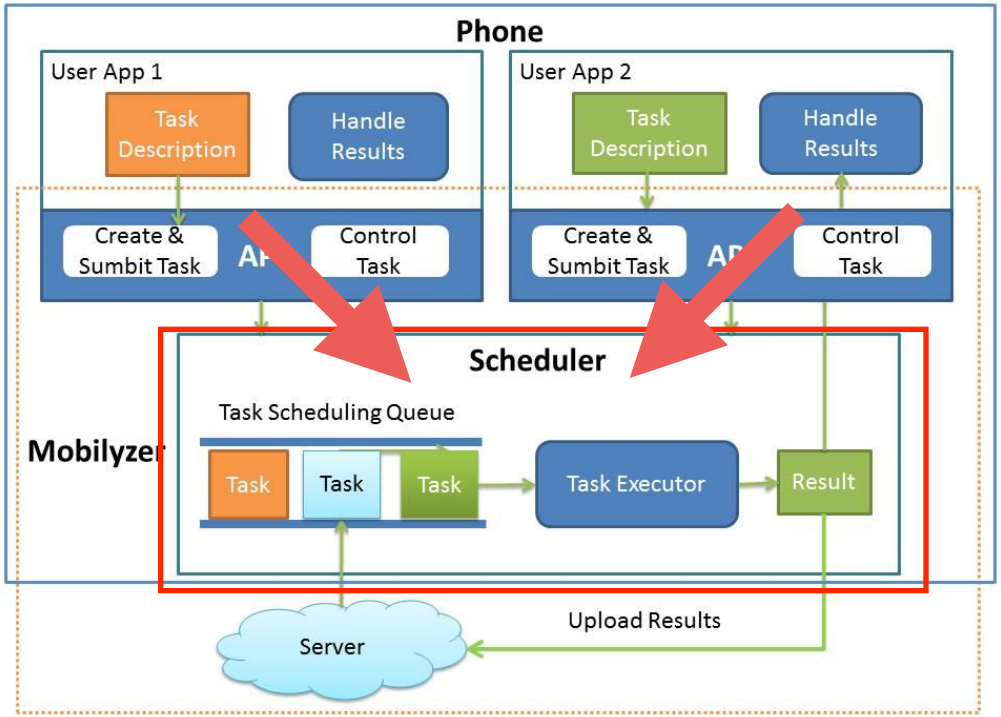

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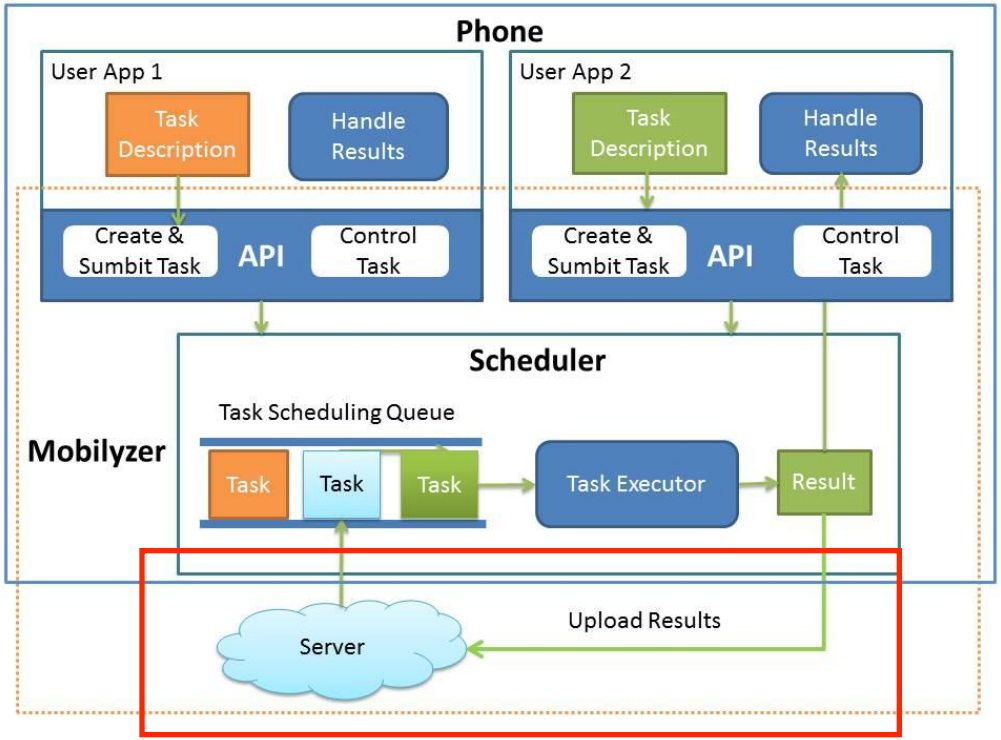
- Data collection



Why Mobilyzer?

Designed with researcher incentives in mind

- Simplifies app development
  - Just ask Nick's student
- PlanetLab-like participation model
  - Bring one Mobilyzed app, run measurements on all devices
- Dynamic server-side control of measurements

See Hongyi's and Ashkan's posters for more

One last thing

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- Challenges
  - What traffic triggers differentiation?
  - How do we tell that the ISP is doing anything (vs. noise)?
- Our approach
  - Record and replay traces of real traffic from mobile apps
  - Use VPN tunnels (**Meddle**) as controlled experiments

See Abbas' poster for more info!

Thanks!

Obligatory project URLS

http://mobilyzer-project.mobi

http://mobiperf.com

http://meddle.mobi

http://openmobiledata.appspot.com