PORTOLAN
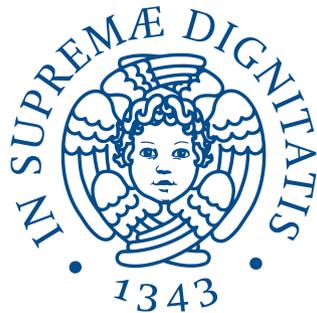# A Smartphone-based Crowdsourcing System for Network Sensing

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Objective

Measure large-scale wired and wireless networks (e.g. Internet, cellular networks)

Motivations

- **Why crowdsourcing?**
  - ✓ The power of crowds
  - ✓ Multiple points of observation
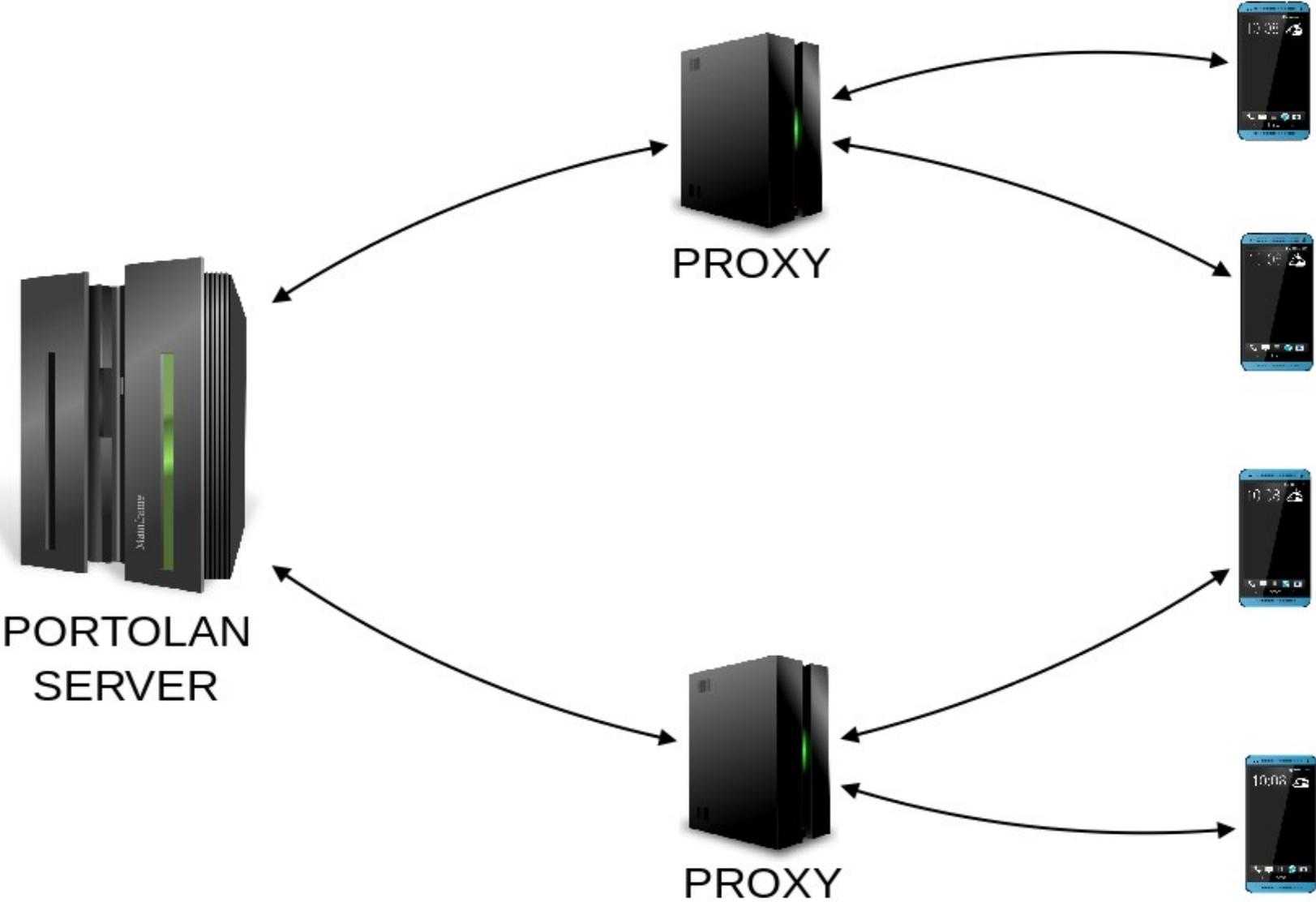 - ✓ End-user experience

- **Why smartphones?**
  - ✓ Great number of devices
  - ✓ High mobility and always on
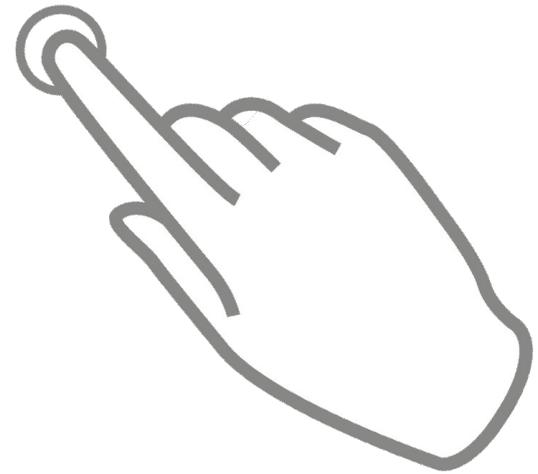 - ✓ Easily geolocalized

Architecture

PROXY

PORTOLAN
SERVER

PROXY

Measurements

- **Background measurements**
  - ✓ Assigned by the server
  - ✓ No interaction with the user

- **Manual measurements**
  - ✓ Run by the user
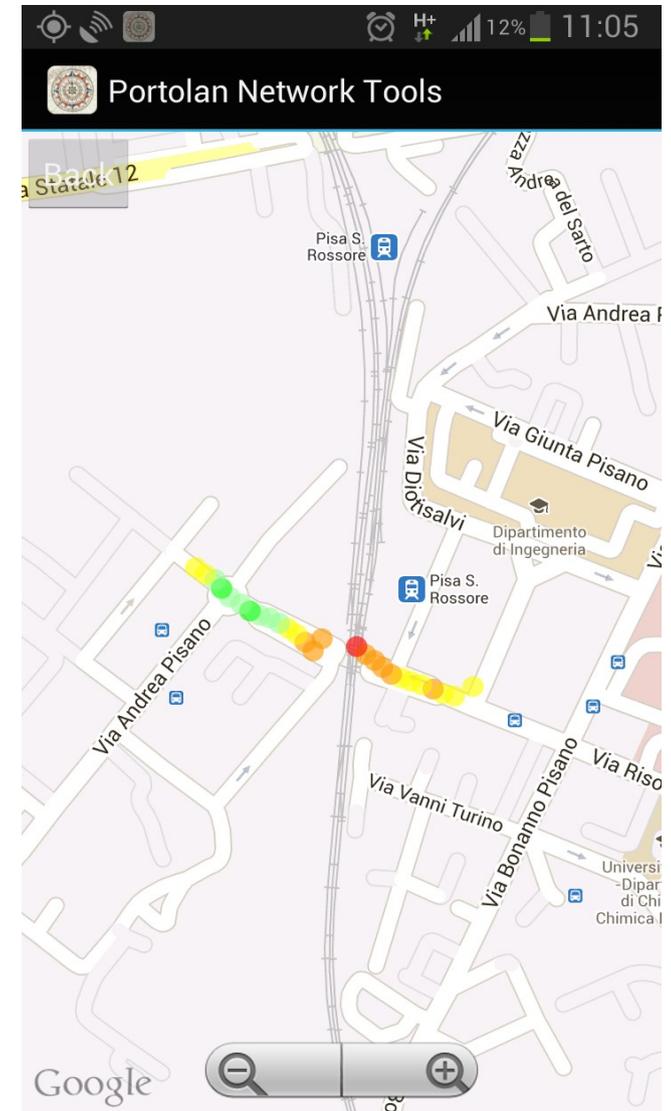 - ✓ Results sent to server

Background measurements

- **Internet AS-level topology discovery**
  - ✔ Active probing with UDP Paris Traceroute
  - ✔ Regional traceroute campaigns (source and target in the same country)
  - ✔ IP-to-AS mapping on server (based on Isolario BGP data)
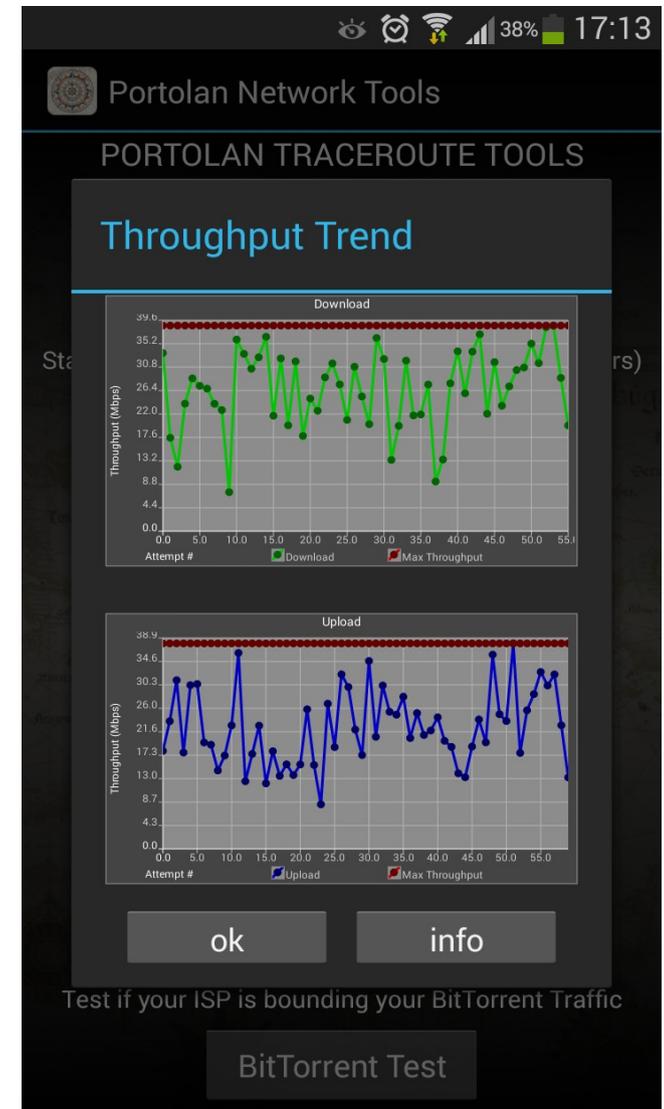 - ✔ Low battery and bandwith consumption (max 1% and 2 MB per day)

Manual measurements

- **Signal coverage mapping**
  - ✔ Collecting RSSI samples associated with GPS positions

- **Maximum throughput estimation**

- **Traffic differentiation discovery**
  - ✔ BitTorrent traffic simulation

Manual measurements (I)

- **Signal coverage mapping**
  - ✓ Collecting RSSI samples associated with GPS positions

- **Maximum throughput estimation**

- **Traffic differentiation discovery**
  - ✓ BitTorrent traffic simulation

Manual measurements (II)

- **Signal coverage mapping**
  - ✔ Collecting RSSI samples associated with GPS positions

- **Maximum throughput estimation**

- **Traffic differentiation discovery**
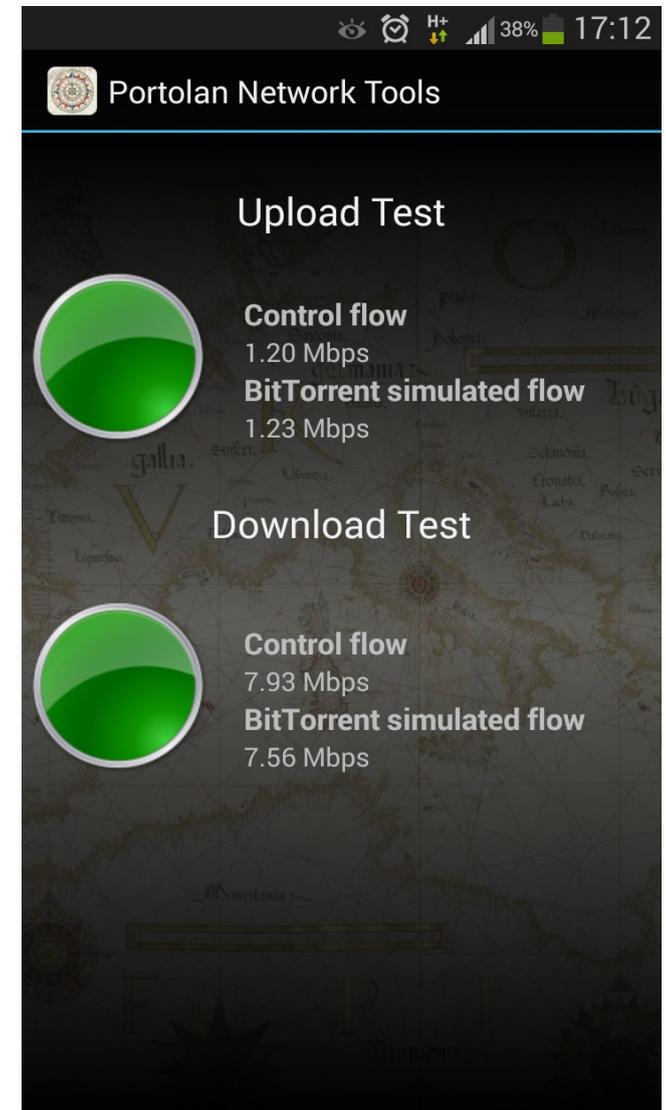 - ✔ BitTorrent traffic simulation

Portolan monitors distribution

Currently ~300 active monitors
Still not enough for our purposes

Future work

- **New measurement tool**
  - ✓ IP addresses geolocation (with ELTE)

- **Extended traceroute experiments**
  - ✓ Together with RIPE Atlas

Discussion

- **How to increase the number of users?**
  - ✓ Advertisements
  - ✓ Useful features (new measurements)
  - ✓ …?

- **How to obtain an efficiently spread user base?**
  - ✓ Mainly for AS-level topology discovery

Thank you!

INFO & DATA
http://portolan.iet.unipi.it

Portolan is available at Google Play Store!