Informing Protocol Design Through Crowdsourcing: the Case of Pervasive Encryption

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Is the Internet Ossified?

Today,many aspects appear to be **“set in stone”**

Criticism: Middleboxes behavior

How will Internet react to a new protocol?

Handley, M. (2006). Why the Internet only just works. BT Technology Journal, 24(3), 119-129.

The case of pervasive encryption

Understand the feasibility of pervasive encryption in the Internet.

Understand the interaction of middleboxes with the TLS across the different TCP ports that currently use plain text protocols.

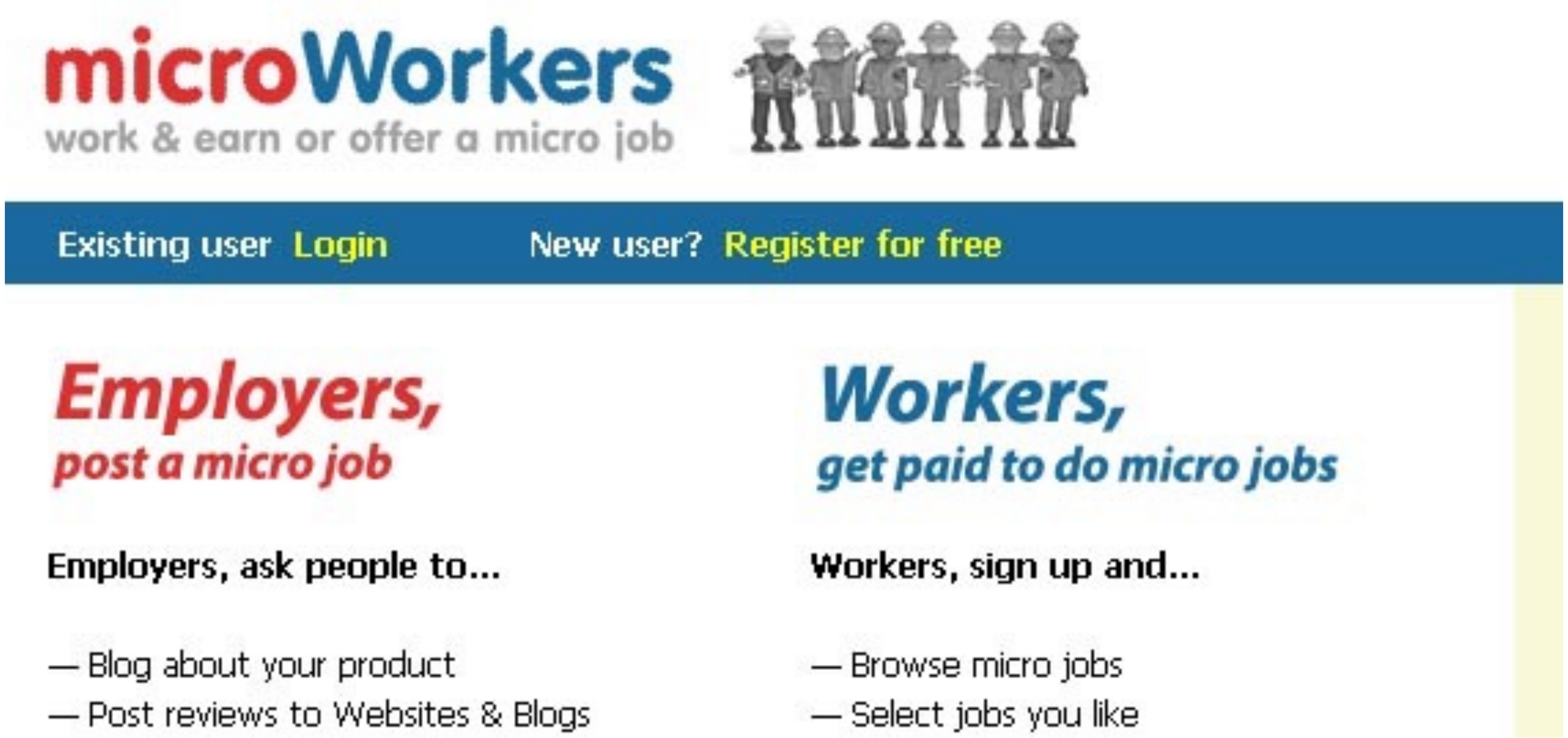
How to measure a thousand end-users?

- Be Google (or any other large Internet players)

or

- Get your code to run on a thousand users' machines through another delivery channel

Crowdsourcing platform



microWorkers
work & earn or offer a micro job

Existing user Login New user? Register for free

Employers,
post a micro job

Employers, ask people to...

— Blog about your product
— Post reviews to Websites & Blogs

Workers,
get paid to do micro jobs

Workers, sign up and...

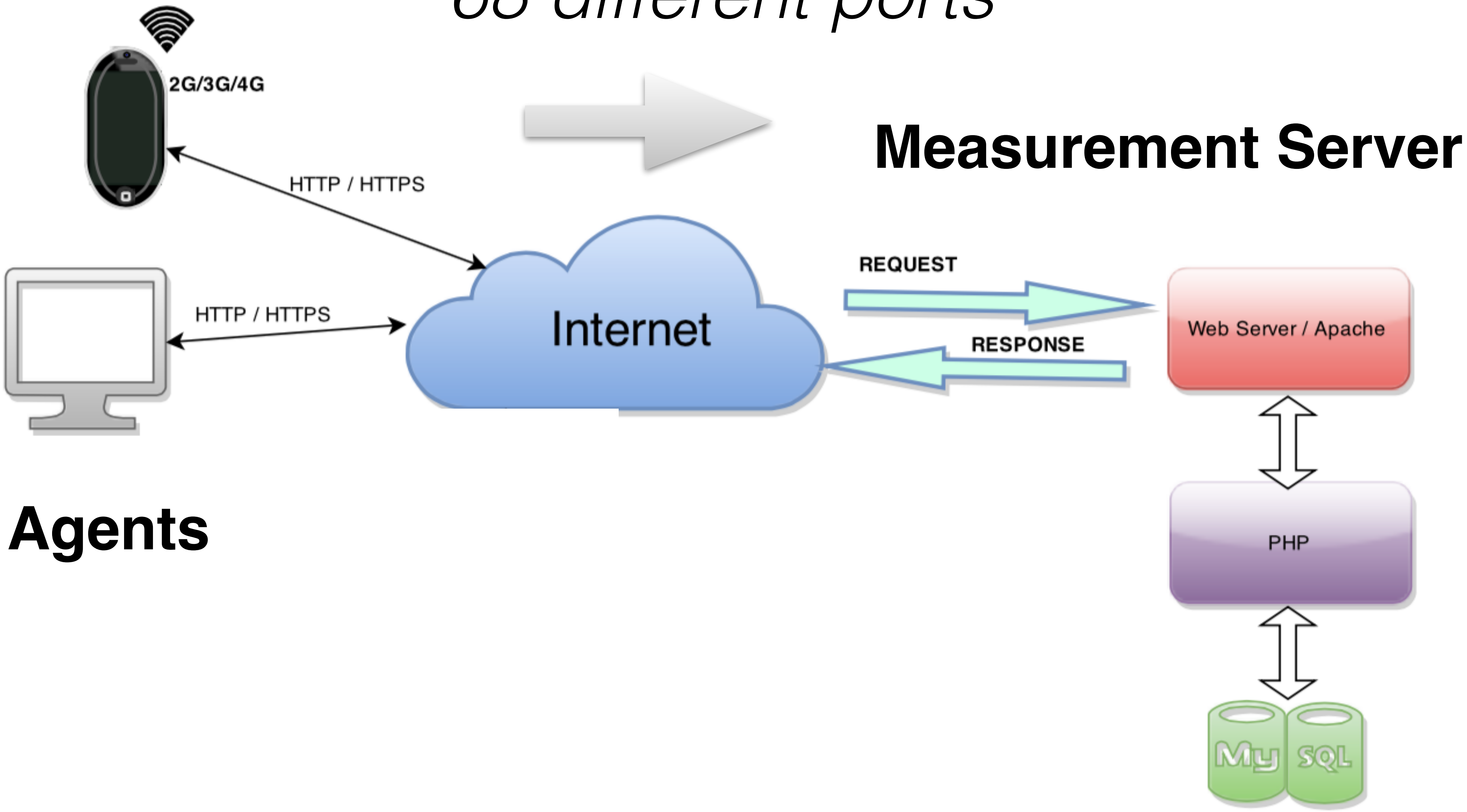
— Browse micro jobs
— Select jobs you like

Perform large-scale Internet measurement campaigns

Experimental setup: Measurement Agent Common Procedure

- In the background, HTTP and HTTPS connections are performed from the measurement devices to our servers in all the 68 ports

TLS connections over 68 different ports

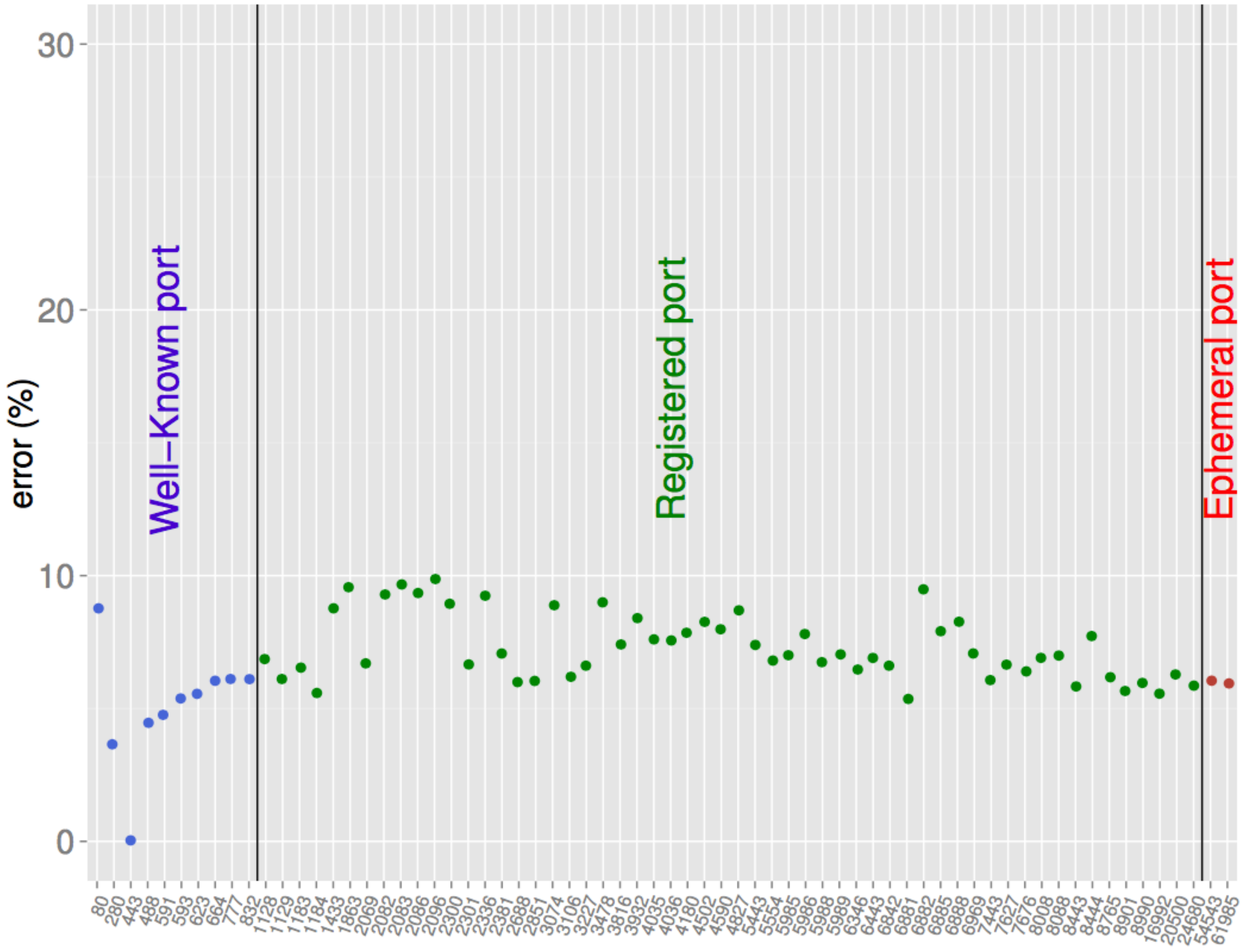


Measurement Server

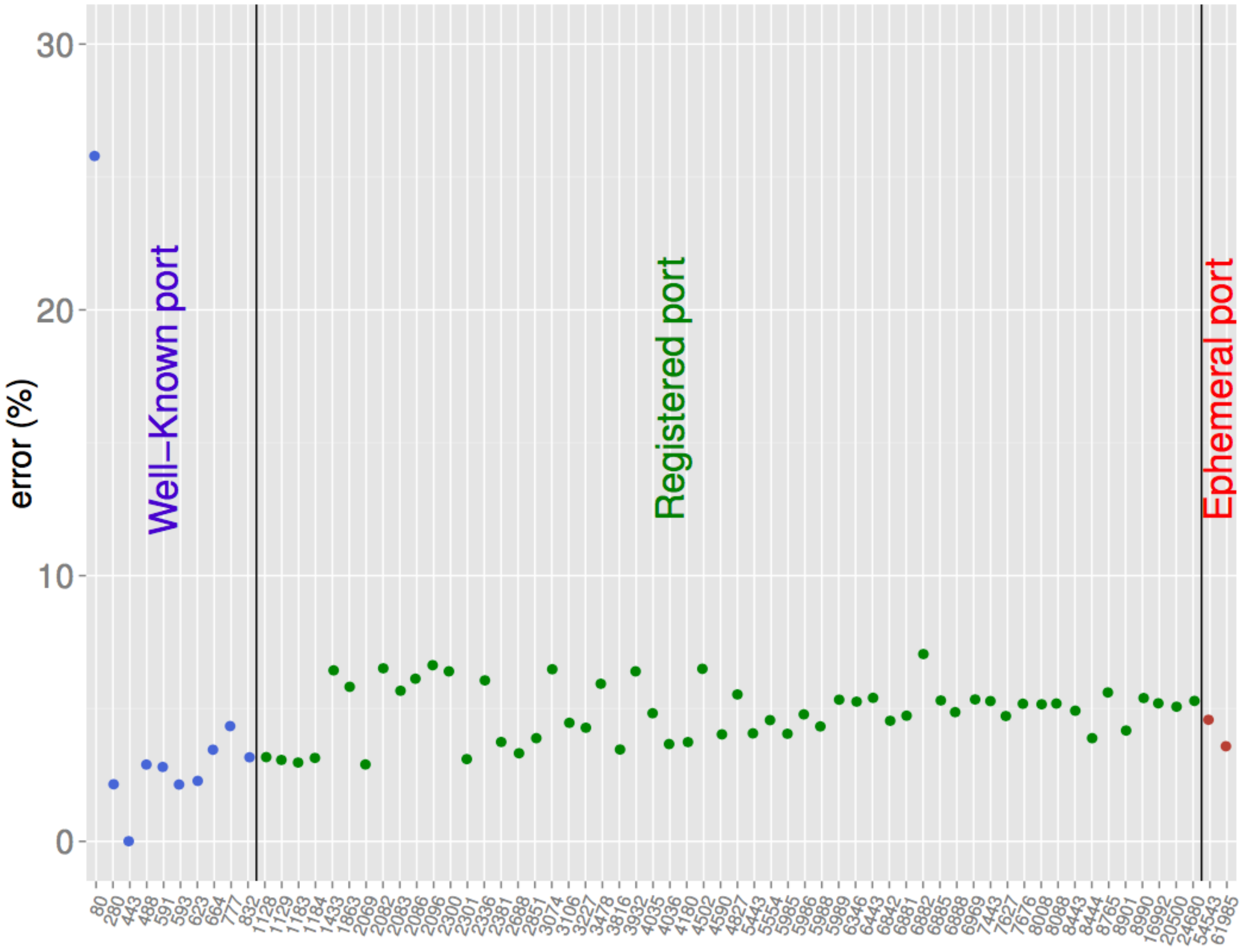
Measurement Agents

Aggregated results

$$ERROR = (success\ [HTTP] - success\ [TLS])$$



a) Fixed line

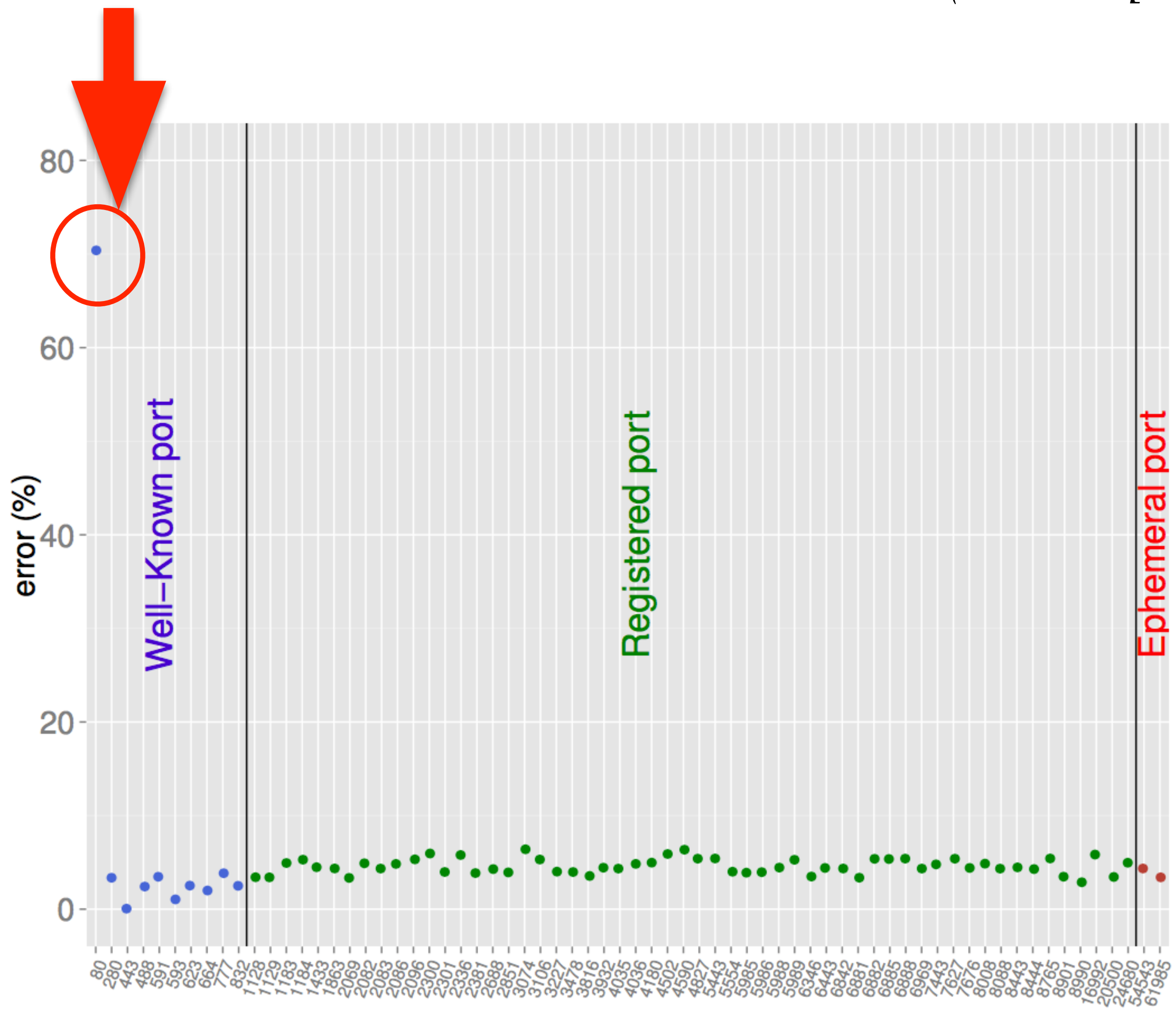


b) Mobile network

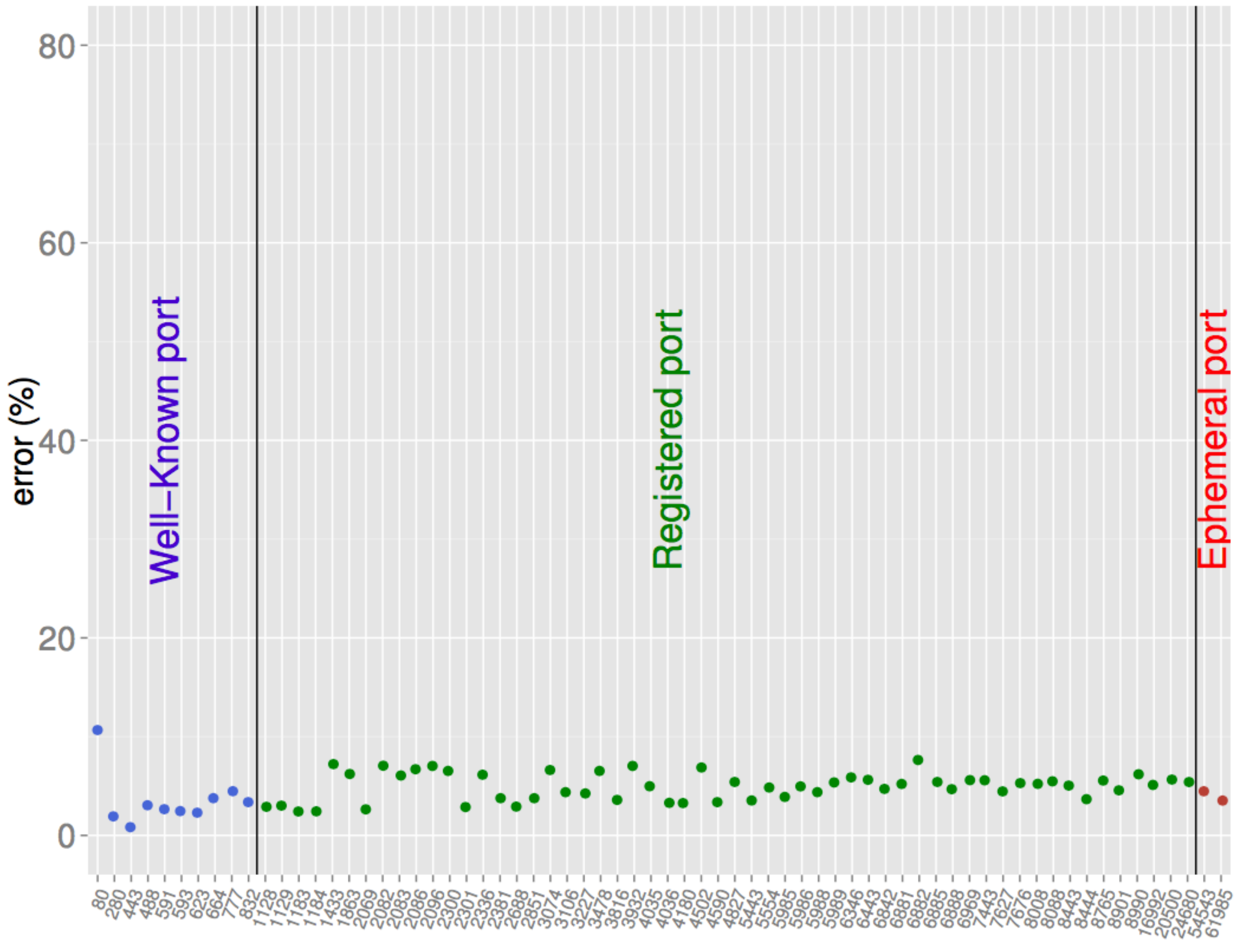
25% of the users are not able to perform a TLS connection over port 80 in mobile network.

Proxies

$$ERROR = (success\,[HTTP] - success\,[TLS])$$



a) Mobile proxy



b) Mobile non-proxy

70% of the users that use a proxy are not able to perform a TLS connection over port 80 in mobile network.

Conclusion

- Overcome several of the limitations of the crowdsourcing platforms;
- It is probably feasible to roll out TLS protection for most ports except for port 80, assuming a low failure rate (6%);
- Our results can serve as a lower bound for the failure rate for using protocols other than expected in different ports.