Location Guard
browser extension for location privacy

Kostas Chatzikokolakis
CNRS, INRIA, LIX Ecole Polytechnique

joint work with
Miguel Andrés, Nicolás Bordenabe,
Catuscia Palamidessi, Marco Stronati

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Location-Based Systems

A **location-based system** is a system that uses geographical information in order to provide a service.

- Retrieval of Points of Interest (POIs).
- Mapping Applications.
- Deals and discounts applications.
- Location-Aware Social Networks.
Example

- Find restaurants within 300 meters.
- Hide location, **not** identity.
- Provide **approximate location**.
Obfuscation
Obfuscation

area of interest

reported position
Obfuscation

area of retrieval

area of interest
Obfuscation

area of retrieval

area of interest
Obfuscation
The Goals

- We want an obfuscation mechanism.
- Formal privacy definition, independent from prior information.
- Easy to compute, independently of the number of locations.
- No need of a trusted third-party.
Towards a Definition

- Secrets are **locations**.
- Attacker’s goal: **distinguish** location $x$ from $x'$.
- The closer two locations are, the more indistinguishable they should be.
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Line of work

[PETS’13] privacy under general metrics

[CCS’13] application to location privacy, planar Laplace

[CCS’14] mechanisms of optimal utility

[PETS’14] protecting location traces

[sub. PETS’15] metrics adapted to the semantics of the map (Marco)
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Tool: Location Guard
Location Guard: goals

Provide a simple solution, for sporadic, real-time LBS access

Can we make it simple enough so that people actually use it?

Understandable, configurable by human beings

Low-level, application-agnostic solution
Location Guard: goals

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Low-level, application-agnostic solution

OS-level on smartphones (problem: rooting the phone)

Browser level (desktop & mobile)
HTML5 geo-location API

Asking the browser for the user’s location
navigator.geolocation.getCurrentPosition(function(pos)
    alert("Latitude: " + pos.coords.latitude +
    "Longitude:" + pos.coords.longitude
    );
);
Location Guard: adding noise

navigator.geolocation.getCurrentPosition(function(pos)
    alert(
        "Latitude: " + pos.coords.latitude +
        "Longitude:" + pos.coords.longitude
    );
);

Intercept the javascript call
Content-script, running in separate javascript enviroment
Inject code in the page, replace navigator.geolocation
Transparent to the user
User interfaces are hard

No initial setup, user configuration if needed
User interfaces are hard

No initial setup, user configuration if needed
Mobile support

Privacy level: medium

- Set level for demo-page
- Pause Location Guard
- Hide icon
- Options
- What is Location Guard?
Mobile support
User adoption

Timeline

Nov 2013: Chrome
Jul 2014: Firefox
Feb 2015: Firefox Mobile
Feb 2015: Opera
User adoption

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Current users

Chrome: 6224 active
Firefox: 4642 active
Firefox Mobile: 370 active
Opera: 2134 downloads
How do users discover Location Guard?

No publicity

Huge number of extensions (1367 in Firefox privacy category alone!)
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Occasional promotion by Google/Mozilla

Mostly by searching (users care about privacy!)

“location” : position 1-2
“privacy” : position 35-40
Change your location in Firefox using Location Guard

by Martin Brinkmann on December 1, 2014 in Firefox - Last Update: December 1, 2014

Geolocation, the retrieval of a connecting user’s location in the world, can be beneficial to both user and website operator. When you connect o a weather website for instance, it is often the case that you want weather information for the location you are at.

It can also be comfortable to be redirected to a country-specific version of a website.

Sometimes however, geolocation can backfire. This can be the case if you want to look up weather information for another location, if you don’t want to be redirected automatically, or if the location that the service discovers is incorrect.

Privacy is usually not part of the problem and the main reason for that is that browsers such as Firefox display prompts before websites may access your location. Then again, if you allow it you may dislike that it can pinpoint your location precisely.

Location Guard is a relative new extension for the Firefox web browser that can be configured individually for each domain you visit that wants to access location-based features.

It offers two main features: the first enables you to add noise to your location so that it cannot be pinpointed with accuracy anymore. The second feature on the other hand sets your location to any place in the world.
ghacks.net article
Chrome: linear growth
5 stars
Works as advertised. I like that there is an option that allows a user to set their location to wherever they choose.

Also, I like the idea of having a fixed location instead of just adding noise to the geo.
1 star
After installation, I can not find any icon / starting point on FireFox!
We added a demo page...
Reviews

1 star
It doesn’t work, weather.com and wunderground.com hit on my zip code immediately. I restarted the computer and it still doesn’t work.
Reviews

5 stars
Very awesome idea, I didn’t try this but I think it’s a great idea.
Future directions

Try new research ideas

Adapt the noise to the semantics of the location
Future directions

Try new research ideas

Adapt the noise to the semantics of the location

Study the users’ behaviour

Collect statistics (with the user’s consent)