

# Measuring popularity of darknet sites

Degree programme : BSc in Computer Science | Specialisation : IT Security  
Thesis advisor : Prof. Dr. Emmanuel Benoist  
Expert : Dr. Igor Metz (GLUE Software Engineering AG)

The Tor network is used to hide traffic to website. Moreover websites are hidden within the Tor network. We call them hidden services. Our goal is to find the most visited hidden services over a two-month period. To achieve this, we create an infrastructure of six hidden service directories in the Tor network. These servers receive encrypted requests from Tor users that we decrypt. Thereby, we know which hidden services are visited and by how many clients.

### Introduction:

There are tens of thousands of sites on the darknet. In the Tor network, these sites are called hidden services. Tor encrypts traffic and makes users anonymous by changing their IP addresses. As a result, the main sites are drug markets, forums and images hosting services. Our goal is to collect clients encrypted requests and compile a list of the most visited hidden services.

### Concept:

When a client wants to contact a hidden service, they only need to type the onion address of this site. The encrypted request reaches a server called Hidden Service Directory (HSDir), which transfers a descriptor to the client. This descriptor is also encrypted and contains all the information to contact the requested hidden service. The idea was to create some HSDir on the Tor network to host information from hidden services. On average, an HSDir contains about 1300 descriptors. A hidden service is randomly assigned to a limited number of HSDir. This relationship changes over time. So, when a client requests access to a site

to which our servers are assigned, we pass on the descriptor in question. Thus, the HSDir can log that request. Then we decrypt the descriptor and store the name of the hidden service in a database. Finally, we aggregate all our data for the final statistics.

### Architecture:

To achieve our goal, we have divided it into several steps:

- Adapt a crawler to get a maximum of sites URL on the darknet
- Modify Tor's source code to retrieve encrypted data that says customers visited sites
- Decrypt this data with the list of recovered sites (dictionary attack)
- Store the results in a database

### Results:

In the final list of the most visited sites from April to May, the first two are drug markets, the others are mainly forums and image hosting sites. This list is not



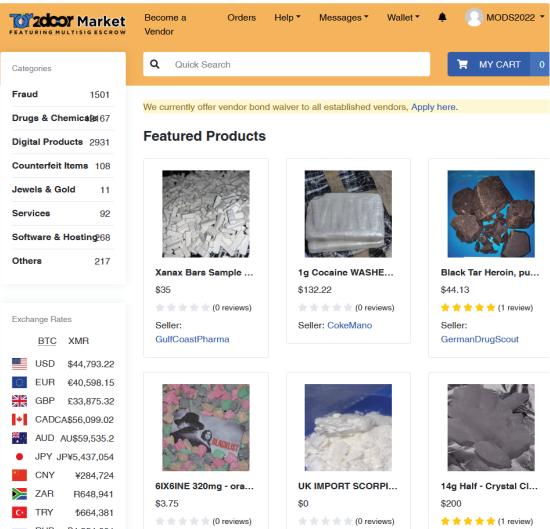
Liviu Grozea  
liviu.grozea15@gmail.com



Arthur Louis Simonin  
arthur.simonin@gmail.com



Mike Zanella  
mike@zanella.io



Site	Requests
BlackSprut	381'022
Tor2Door	148'782
Mega Market	99'356
HDDoro	20'441
Amorzinho	14'285
Easy Image Upload	10'498
Brave	10'330
imgghost	9220
Darkhost	6392
The Resistance	5980
TorDex	4546
The Pirate Bay	4079