Darknet and Social Network Monitoring

Introduction to Challenges, Concepts and Data Mining of the Deep Web



Alexandre Dulaunoy

alexandre.dulaunoy@circl.lu

Aurelien Thirion aurelien.thirion@circl.lu

Jean-Louis Huynen jean-louis.huynen@circl.lu

info@circl lu

October 15, 2021



- The Computer Incident Response Center Luxembourg (CIRCL) is a government-driven initiative designed to provide a systematic response facility to computer security threats and incidents.
- CIRCL is the CERT for the private sector, communes and non-governmental entities in Luxembourg.

CIRCL Missions 1/2

- Provide a systematic response facility to ICT-incidents;
- Support national ICT users to recover quickly and efficiently from security incidents;
- Minimize ICT incident-based losses, theft of information and disruption of services for the private sector;

CIRCL Missions 2/2

- Gather information related to incident handling to better prepare future incidents management and provide optimized protection for systems and data;
- Coordinate communication among national and international incident response teams during security emergencies and to help prevent future incidents;
- Provide a security related alert and warning system for organisations in Luxembourg and abroad;
- Foster knowledge and information exchange in cybersecurity lead the development of MISP project;

Links

- AIL project: https://github.com/ail-project
- AIL framework: https://github.com/ail-project/ail-framework
- Training materials: https://github.com/ail-project/ail-training
- Online chat: https://gitter.im/ail-project/community

Ethics in Information Security and Cybersecurity

- The materials and tools presented can open a significant numbers of questions regarding ethics;
- Our researches and tools are there for education, supporting the public good and improve incident response;
- We ask all users and participants to follow ethical principles and act professionaly¹.

¹https://www.acm.org/code-of-ethics

Privacy, AIL and GDPR (PII) - An Ethical Question

- Many modules in AIL can process personal data and even special categories of data as defined in GDPR (Art. 9).
- The data controller is often the operator of the AIL framework (limited to the organisation) and has to define legal grounds for processing personal data.
- To help users of AIL framework, a document is available which describe points of AIL in regards to the regulation².

²https:

Objectives

Our objectives

- Provide a quick overview to darknet, deep web, collection and cyber threat intelligence lifecycle;
- Review different collection mechanisms and sources;
- Some practical examples of criminal activities and their use of modern technologies;
- Show the benefits of developing open source tools to monitor web pages, pastes, forums and hidden services;
- · Quick introduction to the open source AIL project;

Introduction

Concepts - Deep Web

- Deep Web is the part of World Wide Web not indexed or directly accessible by standard web search-engines;
- This can be content hidden from crawlers by requiring a specific access and this can includes private social media, password-protected forums or content protected by different measures such as paywalls or specific security interface to access the information;
- A large portion of content accessible via Internet is part of the deep web³.

³also called invisible web, hidden web or non-indexed web

Concepts - darknet

- **Darknet** is an overlay network running on top of Internet requiring specific software to access the network and its services;
- Tor, I2P and Freenet are the most commonly used ones. Many are used for hidden services access and some for proxy access to the Internet;
- There are legitimate use-cases for such network but also many illegal or criminal usage.

Collection and Sources

 Collection (mainly OSINT⁴ or covert/clandestine sources) is the act of gathering manually or automatically data from different sources;

• Determining and maintaining the sources:

- Hidden services (on Tor) such as forums, market places, chatrooms, public site⁵...
- Social network (e.g. Twitter) from Twitter⁶ to Instagram.
- Chat and discussion forum from Discord, Telegram⁷ and private hidden one on Tor or other overlay networks.
- News and security reports⁸.

⁴public or open source sources

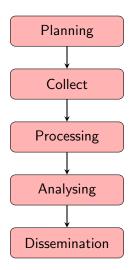
⁵https://github.com/ail-project/ail-splash-manager

⁶https://github.com/ail-project/ail-feeder-twitter

⁷https://github.com/ail-project/ail-feeder-telegram

⁸https://github.com/ail-project/ail-feeder-atom-rss

Lifecycle of collection and analysis



Collecting, processing and analysing content - web pages

- Building a search engine on the web is a challenging task because:
 - it has to crawl webpages,
 - it has to to make sense of unstructured data,
 - o it has to **index** these data,
 - it has to provide a way to retrieve data and structure data (e.g. correlation).
- Doing so on Tor is even more challenging because:
 - o services don't always want to be found,
 - o parts of the dataset have to be discarded.
- in each case, it requires a lot of bandwidth, storage and computing power.

Collecting, processing and analysing content - structured data

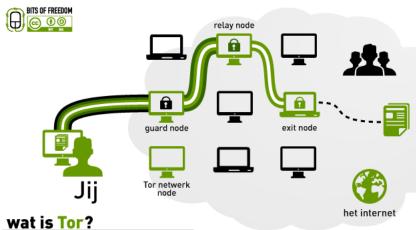
- Some data are structured and are easy to process:
 - metadata!
 - API responses.
- Some even provide cryptographic evidences:
 - o authentication mechanisms between peers,
 - o openGPG can leak a lot of metadata
 - key ids,
 - · subject of email in thunderbird,
 - Bitcoin's Blockchain is public,
 - o pivoting on these data with external sources yields interesting results.

Demo of analysed content

Tor - a detailed overview of an overlay network

Concepts - tor⁹

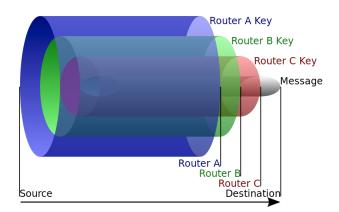
• tor makes use of **onion routing** to obfuscate user identify,



⁹license: Bits of Freedom CC BY-SA 3.0

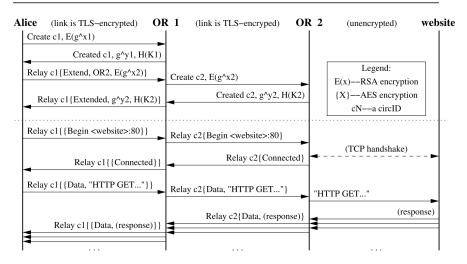
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Concepts - tor^{10}



¹⁰license: Harrison Neal CC BY-SA 3.0

Concepts - tor¹¹



 $^{^{11}\}mbox{license: Roger Dingledine, Nick Mathewson, Paul Syverson CC BY 3.0 <math display="inline">_{21~\mbox{of}~22}$

Concepts - tor

- tor provide hidden services: addresses in .onion,
- one can only reach such service when one knows its address,
- hidden services' information are stored in a Distributed Hash Table.
- these are really interesting for attackers as:
 - these are anonymous,
 - these can be provided through NATs,
 - o these can be moved easily.