

# Darknet-A Novel Approach in The Field of Information Security

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**Abstract-** Starting with the surface, the surface web is any other server for instance yahoo, Bing or Google. The deep web is something that any server or search engine cannot find. While the Darknet is a fragment of the Deep Web that is hidden or not accessible through any web browser. Like the bright side on the internet, where there are unlimited resources regarding technology, science, medicine and etc., likewise there is also a dark side, which includes drugs, contract killers market place, where the evil doers are benefitted and get the likewise protection as of the sites which are easily available and is for the good. [7][9] This paper primarily focuses on the history, the hidden services provided by the Dark Net and further the scope as well as the limitations has been concluded.

**Keywords –**Dark Net; Deep Web; Bitcoin; Anonymity; Hidden Services;Block chains; Deep Web Crawler; WikiLeaks

## I. INTRODUCTION

The Dark Net also called as “Undernet”. “Invisible Web” and “Hidden Web”. It consists of the same algorithm as that of the Google’s. In the World Wide Web, there is something beyond the reach of Google or any other search engines. The web pages are in hidden form in this ‘Dark Net’, but many techniques that are used in present may assume the existence of domain language, which can be expensive and not easy to maintain. [7]

The software for confidentially and anonymously connect the users to the internet is commonly known as “Tor”[3]. In the present scenario it is used by a variety of organizations as well as the individuals for a variety of purposes. Like the two faces of a coin, the software ‘Tor’ has two facets that support both good and bad users. It exists within many applications today like as web browsers, remote login and many other applications based on TCP protocols.

Tor or “onion routing”, was developed by the United States Naval Research Laboratory employees, by computer scientists G. Reed and David Goldschlag along with mathematician Paul Syverson in the mid-1990s. After that many versions of Tor, it has been developed and updated since then. Then in December 2006, the Tor project was formed by Dingledine, Mathewson and five others. In a Massachusetts based non-profit organization.

Then in December 2014, Tor’s weaknesses were exploited, since it was relatively slow and had high latency and low throughput. But these practices of not having lack of any boundaries and protecting the identity of users are few of the important features of Tor and using ‘Hidden Services’ are in focus. The developers of the ‘Tor’ software are also called the Tor Project. With its release date of October 29, 2015. The languages used to make it are C, C++, CSS, JavaScript and XUL. It’s in English language with its OS or the operating system is Windows XP and UNIX like. [7][11]

## II. LITERATURE REVIEW

### A. PEER TO PEER NETWORK

Peer to peer network, is a simple network that is referred as a workgroup in windows. In this type of network there is no server that is acting as central authority. It is best suited for a small office home. As well as a peer to peer network is so simple that that it can act both as a server as well as a client. Its advantages are that it is cost ineffective that is low cost is involved in this and it is quite simple and easy to use.[13] But there also its disadvantages.

That is it is quite difficult to administrate and is difficult to relocate sources in it. As well as only a limited number of connections are made it that is approximately only till ten. For most companies, using computer and employee information is an everyday task of doing business. On a typical day we might use credit card numbers, medical information, social security numbers and other personal data that we have in our files. If this information gets to the wrong hands, it could lead to fraud or identity theft. That’s why to protect this sensitive data file sharing is considered. Peer to Peer file sharing is a way for people to share software and documents with other computer uses. It lets us to connect our PC to a network of computers. Then we can view and download file through it. And millions of people can access to file sharing at one time but it can expose them to certain risks. Including viruses as well as the malwares. Making our private files public for the world. But according to our needs we can setup a few policies. And once our policies are in place, it minimizes the risks. But there are easy hacks for it, first delete the sensitive information that we not need to have. Secondly, restrict the places where sensitive

information can be placed and third is that to minimize the use of file sharing on computers with sensitive information.[14]

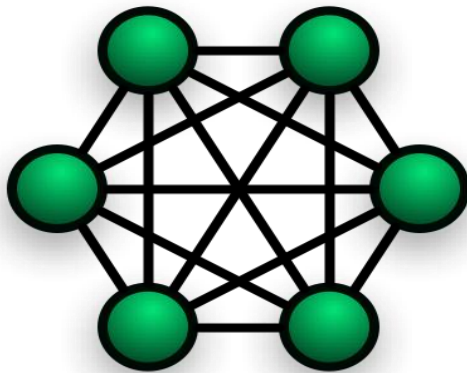


Fig. 1. Peer to Peer Network

### B. SERVER BASED NETWORK

The server based network acts as a central authority. In this network, all the user accounts and the data is stored only on the server. Its advantages are that it is more secure than the peer to peer network and as well as makes the administrative easier. But it has a few disadvantages that the cost of the server and the cost of the operative system is quite high.

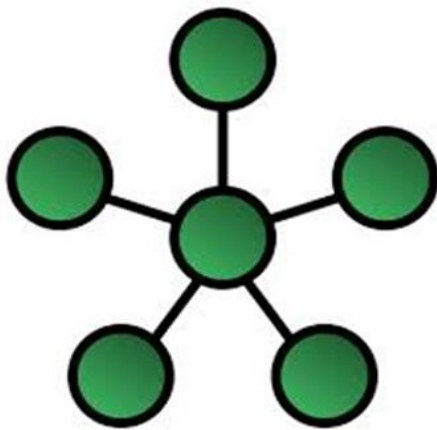


Fig. 2. Server Based Network

And thus is the onion router or Tor, the software that enables the launching of the dark net websites. The dark net websites mainly comprises of the whistle blowing websites, anonymous emails, direct downloading and bit torrent, discussion on hacking, drugs, bitcoin, WikiLeaks, anonymous blogs and pornography of varying legality. [15]

## III. FEW HIDDEN SERVICES

### A. .DARKNET DRUG MARKET

One of the commercial website is the drug market in the dark net that can be operated by the Onion Router or Tor.

Not even the drugs that are sold, but also involve transactions including weapons, stolen credit cards as well as forged documents and etc. These kind of Market that are mainly the drug market that has a wide range of network that has been starting from the early 1970s, but the main incident involving the deep web took place in 2006. SILK ROAD was a dark net website for selling illegal drugs founded in 2011 by Ross William Ulbricht, but was shut down by the FBI (Federal Bureau of Investigation). It again came into existence on November 6, 2013, and shortly was again was shunted down by the FBI. But sadly, there are alternative sites out there in the deep web. One of the saddest things is that, to attract the attention of the buyers the vendors boast about the quality of their product to the buyer. But then, there is no guarantee, that what can be the side effects of it. [1]

### B. HACKTIVISM

Hacking is another field of computer science that is often related to free speech, human rights movements. There is a popular hacking group in the present times known as anonymous. Hacktivism is a process of hacking or breaking the computer system, whether for social or political reasons. This act is called the Hacktivism and the person, executes it is call hacktivist. There are also types of Hacktivism that are code, which is basically breaking into the computer system, website mirroring; which basically, eliminates all the locks of the censorship, from one website to the next, geo bombing; through which, the content can be placed on the Google earth page and many more including the anonymous blogs.[1]

### C. ANONYMOUS BLOGS

Anonymous generally or literally means no author. These blogs have no author or no contributor. Posts on anonymous blogs eradicate the fear of publicity especially on whistle blower cases. Anonymous blogs include the techniques that have a particular encryption. Anonymous blogs may include or the categories can be political, religious, company insider, customer service, personal and etc. But we can anonymize by tracking the IP (Internet Protocol Address) or by doing the word and character frequency analysis. But it has its own loopholes that are also called anonymizing techniques, one is through social correlation and another through identity correlation. And may include many, comprising of political, and whistle blower, personal and etcetera. [1]

### D. SELF HARM GROUPS/COMMUNITIES

Self-harm groups have been there since the beginning of time. Self-harm is self-injury that is not suicidal intentions, but close to it. It covers a wide range of behavior from ear piercing, nail biting to auto-castration that is from mild to severe and can lead to psychic crises. There can be many causes of self-harm that are mental disorders, psychological factors as well as drugs and alcohol, but can treated using therapy and avoidance techniques. The deep web is even not a place of all the black markets even the Facebook is on it. There are certain websites lying in between the legality and illegality, thus those websites are those related to the self-harm communities. [1]

#### IV. CRAWLING OF A HIDDEN WEBSITE

According to the given algorithm, the deep web crawler must obey some certain rules. Like any other web crawler, a query is made and it has to be put in the web and next, the content is downloaded that takes place in the index page and after that certain links are followed according to the downloaded content. For making our task easier or making the content easier to download, single queries are made. Initially, the web crawler sees that which web queries it has to make, and then it receives it and generate it through the index page. And then on the basis of the links in the link page, it downloads the contents of the hidden website. [2]

So according to the flowchart, the queries which make the task that is of downloading the content from the hidden website are easy and efficient. It is basically for downloading the hidden webpages. Just like the garbage values in most programming languages, the crawler may use irrelevant queries and repeats the process until, downloads are made, so there lays a disadvantage of it. So basically, it all depends upon the crawler that which query it shall select, that can make the downloading easy as well as effective.

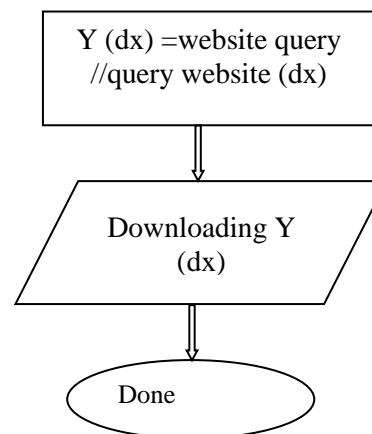
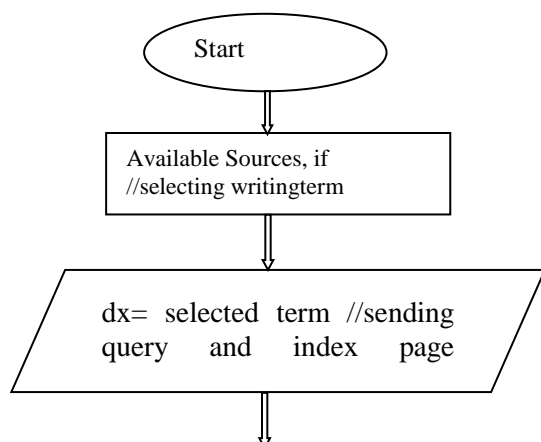
On a closing note, the web crawler does not know that what queries must be there to make the downloading of the web pages easy and effective so, formation of a perfect query is next to impossible.

#### ALGORITHM

```
While (available sources) do //select a term to write
dx=select term() //sending query and acquiring index page
Y(dx)=Website Query(dx)
Downloading (Y(dx))
Done
```

(Extract taken from Downloading the Textual Hidden Content through Keyword Queries, by Alexander Ntoulas, Petros Zerfos and Junghoo Cho, 2005.)[2]

#### FLOWCHART FOR CRAWLING OF A HIDDEN WEBSITE



For general information in the flowchart, the oval shape represents the start and the end of the algorithm. Rectangle represents the query or the information included and parallelogram represents the execution of that query or the information.

Summarizing the above algorithm, simply for downloading the hidden content from the darknet we initially have to see our sources through which we have to select the content to be downloaded. Then we just have to type the website query and thus the content is downloaded. According to the web crawler the number of size of the document is taken into account and the cost estimation. And its main aim is to generate the simplest query of all. The algorithm has to find a near optimal solution as to satisfy the problem at a reasonable computational cost. [2]

There are certain steps followed by any web crawler are that to generate the query, download the content and finally to follow the link that had been downloaded by actual pages. [2]

#### V. BITCOIN METHODOLOGY

The bitcoin are like any other currency, introduced on 3<sup>rd</sup> January, 2009 invented by Satoshi Nakamoto, however Craig Steven Wriht has claimed to be the creator never the lest, but there is a big difference between Bitcoin and bitcoins, 'Bitcoin' refers to an entire system itself and the 'bitcoins' refers to a currency itself. Bitcoins are for electronic purchases and transfers. It's a relatively easier process more easily than the plastic money. All you have to do is to get started by downloading the 'Bitcoin Wallet', this wallet is any other app that we can easily download from our personal computers or smart phones. Bitcoin is not any organization but a process of transaction done peer to peer system by a group of miners. Although it is gaining popularity but still is not with acceptance with the governments since there are chances of money laundering. [8]

How data is accessed? Like any digital data, the data storage is easy and efficient, but the larger the data hence higher the fees associated with it. There are many embedded items which are stored such as the URLs, materials from the WikiLeaks and etc. The medium for storing the bitcoin transactions is the block chain. And the block chains are monitored by a central authority which is the communicating

nodes and each node is responsible for the copy of the block chains. Well, surprisingly the unit of the bitcoin is the bitcoin itself. And the smallest amount of the bitcoin represents 0.00000001 bitcoin. [8] Then to claim your ownership a private key has to be digitally signed by the payer. Without it the transaction cannot be made. And the signature of the payer is verified by the public key. Then in the end the transactions are made which should have one or more than one input which must be unspent of the previous transaction output and again every input must be digitally signed. Mining is processes which keep the block chain consistent, it is done by miners. Here the addition of the transactions record is done in the bitcoin public ledger in the past transactions or the block chains. The ledger is also called the block chains or the chain of blocks. And it confirms the transactions to the rest of the network. As the technology is advancing so do miners, mining pools are becoming common in miners. Which is responsible for decreasing the load by generating new blocks. And it even has protocol for it that specifies that there will be a reward for generating a block that shall be halved into 210,000 blocks every year. Well-paying the transaction fee is optional and there a partiality on the basis of the payment of the fees, that only those who pay a higher fees are preferred first. Privacy: And cyber security risks, the buyers may not have the prior knowledge about the goods they are buying are safe or not. As well as there have been many cases of bitcoin theft. Just like the deep web drug market, murder-for-hire services, there are also a few black market sites, in which bitcoins are sold illegally. But due to the anonymous nature, it hard to crack whether the sale of the bitcoins is real or fraud, just as fishing in the dark. There can be unauthorized mining involved in bitcoin transactions. [10]

#### VI. ADVANTAGES ANDLIMITATIONS

The darknet sites are those which cannot be accessed by indexed search engines. And can only be accessed by the help of a particular software, that is Tor. Although., the Deep Web could be used for an intensive research work or could be used for being out of the box for right reasons such as the whistle blower sites or WikiLeaks. The information on the deep web is not monitored, thus people using it can refer to the information uncensored, which is a unique and a good thing for those seeking the whole information on whatsoever matter, without being in the eyes of anyone. But like two faces of the coin also have its advantages as well as disadvantages. , since the Silk Road that is used for illegal purposes of as in illegal transactions of money, the online drug market and along with many sites which should never be existed. And as well as many engines under the deep web can locate the hidden material, hence certain soft wares are used to save our identity , thus the right tools are needed to access it. Even the speed is also an issue in accessing the deep web since, accessing these websites is comparatively slower than that of surface websites. [4]

But we must remember that the decisions that we make today could bring what kind of consequences to our lives. [5]

#### VII. FUTURE SCOPE

Dark net is based on database that are multi attribute structures and have ethical and social issues. The database of the dark net shall grow exceptionally since many documentaries, shows as well as articles are making headlines. Earlier people were afraid using the Tor software, since they could be on government watch list, but since the times are changing, "Normal People" Are now using the hidden services. Dark net will now become much darker; due to the advancement in technology the operators of the sites would become more customers friendly and could result to be more essential by becoming more decentralized. The dark net market place shall expand its legs since earlier the dark websites such as silk road had been shut down by the FBI and seized around 144000 bitcoins that has been estimated to about 28.5 million dollars, so thinking that such a million dollar site can be shut down in one single day, there are enormous opportunities for other similar sites to exist. The dark net could protect a person's anonymity in future as many companies are exposed to security issues and could cause thousands of employers to flock to the rescue and to plug off the leaking. [3][6]

#### VIII. CONCLUSION

The deep web website hold a wide range of malicious sites that are emerging day by day. Although the government organizations such as the FBI and others are keeping a track record over it by shutting them down , but still the dilemma is that the alternative websites are being created for each website that is being shut down by the authorities. And the market for it is boosting by the time. And this is creating an improvement in the search engine technology without any doubt. As said before in limitations of the dark net, just like two faces of the coin, one side has an advantage and the other its disadvantage. It is worth of or time to under its future investigations, its contents and we must have the power to harvest it. [3][4][5][6][11]

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