50 Shades of Dark

Threat Intelligence Reveals Secrets: From the Surface to the Dark Web

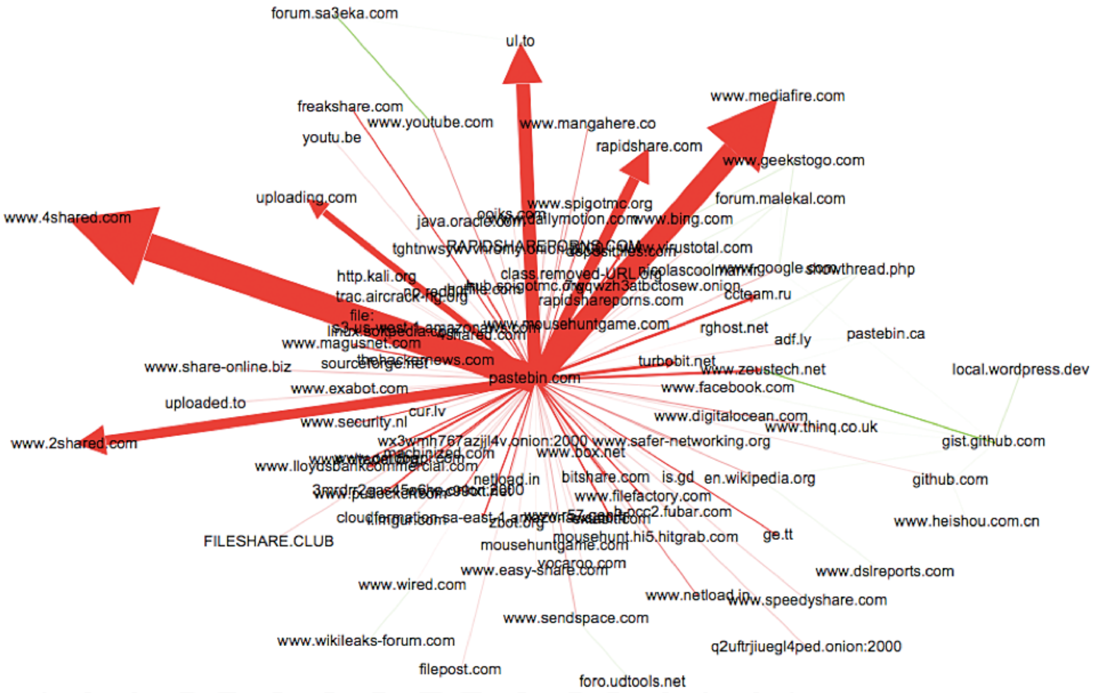
Summary

There is a lot of talk about the Dark Web these days, not least about how cybercriminals use it to spread malware, leak intellectual property, and publish user account credentials.

We decided to explore the Surface, Deep, and Dark parts of the Web to see what information is available and how it is connected. What we found was that there really is no sharp border between them. Information tends to seep into the Surface Web from its darker parts, and it is more appropriate to talk about one Web, with different shades of darkness. The logic behind this is that brokers of illicit information on the Dark Web need to market their products, and hence need to post links to them on the Surface Web (Brian Krebs has noted the same[1]).

Using Recorded Future's real-time threat intelligence we can identify paste sites and forums as primary nodes of communication between the Surface and Dark Web, and show how these are used to link to both TOR/Onion sites and various download sites.

This connectivity allows us to harvest and analyze metadata (such as link patterns, activity levels, and topics) about the Dark Web from the Surface Web, giving us access to valuable information for threat analysis.



[1] http://krebsonsecurity.com/2015/04/taking-down-fraud-sites-is-whac-a-mole/

Introduction

People talk about the Dark Web as a mysterious place, hard to find and inaccessible to normal Internet users. In this paper we argue that there is no sharp border between the Surface Web and the Dark Web, and that there are indeed links from the former to the latter. Different parts of the Web thus exhibit varying degrees of shadiness, and can even be characterized by both actual content and what it links to. Conceptually, we might distinguish three levels of the Web, each portraying different characteristics:

- Surface Web
  - Freely accessible
  - Indexed by Google, Bing, and others
  - Mostly open, but sometimes behind pay walls
  - Fairly stable, content is available from source for a long time
  - Language (mostly) suited for traditional Natural Language Processing (NLP), and tools exist for extracting and analyzing data
- Deep Web
  - Often behind logins, but accessible to anyone registering
  - Database driven, and therefore not indexed by search engines
  - Sometimes by invitation only
  - Mostly un-indexed by search engines such as Google and Bing
- Dark Web
  - Not indexed or searchable by Google, Bing etc.
  - Often on other networks such as TOR[2], Freenet[3], I2P[4], etc.
  - Frequently behind logins, accessible by invitation only
  - Sometimes uses special language like slang, leetspeak etc. which is not easily analyzed by normal NLP tools.
  - Volatile, with content that sometimes only stays available for a few minutes (in one study we did more than 10% of Pastebin posts were removed within 48 hours)

Information tends to seep out even from the darkest corners of the Web, if for no other reason than because that information has a value, which cannot be realized unless it is possible to find. Therefore it has to be marketed in some way. Wikipedia lists three uses of the Dark Web[5] (or Darknet):

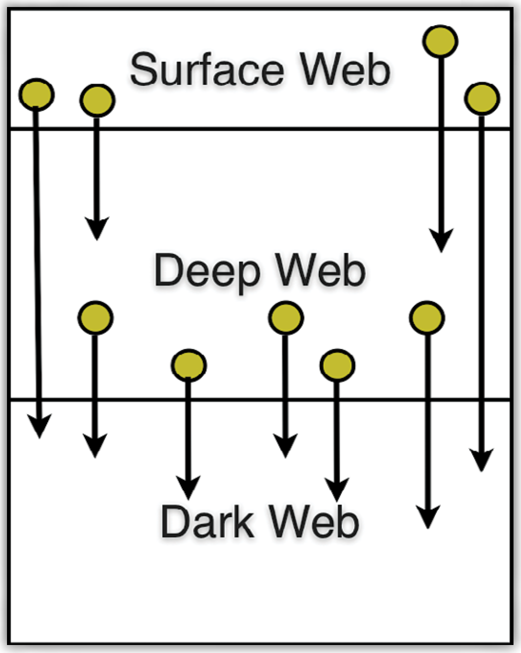
1. Out of privacy concerns or for fear by dissidents of political reprisal
2. To publish for criminal gain
3. To share media files (sometimes copyrighted files)

Clearly, our argument that information needs to be made accessible outside of the Dark Web to realize its (monetary) value holds for both (2) and (3) in this list. The Surface and Deep Web contain links to the Dark Web. How frequent is such information?

[2] https://www.torproject.org/
[3] https://freenetproject.org/
[4] https://geti2p.net/en/
[5] http://en.wikipedia.org/wiki/Darknet_(overlay_network)

The Data Set

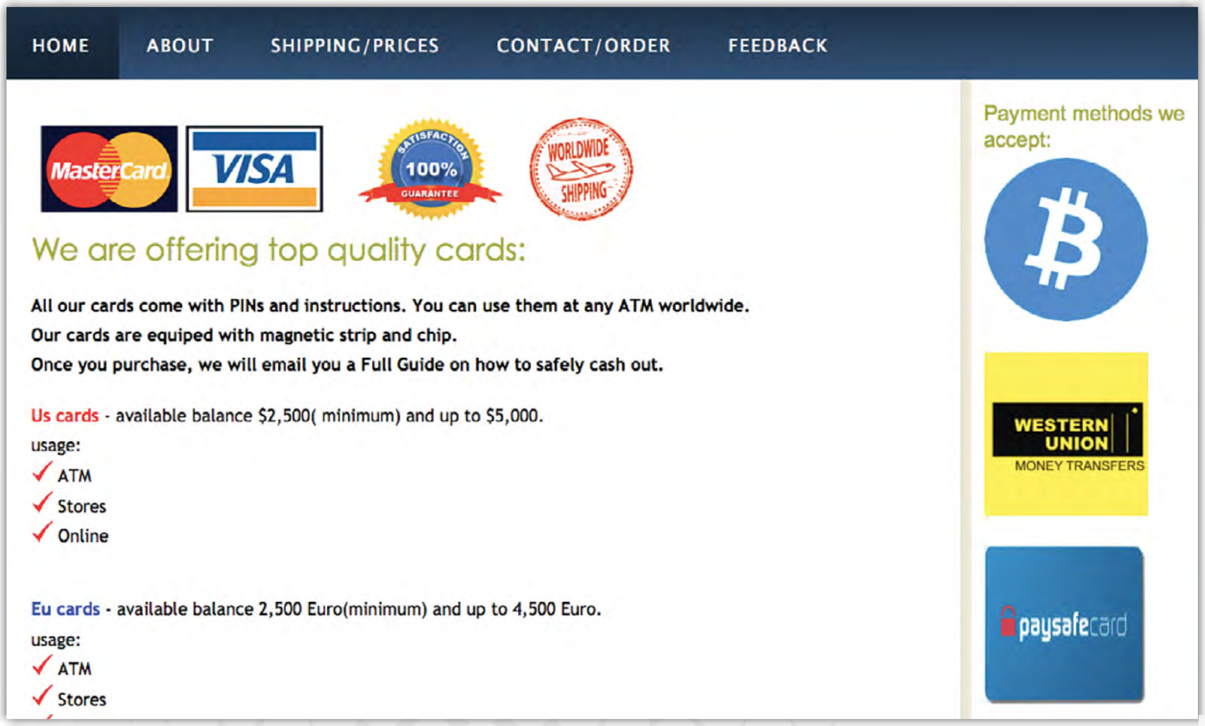
Recorded Future analyses more than 650,000 sources, ranging from government websites and big media to blogs, forums, paste sites, and social media. The Recorded Future index goes back more than six years in time, and has analyzed more than 8.3 billion references to facts, each an individual mention of an event in a document. Of these 8.3 billion references, more than 700 million come from paste sites (such as Pastebin, Slexy, CopyTaste), one of the source types we identify as bridging the Surface and Dark parts of the Web. Recorded Future's index contains 5 million references to malware, over 10 million references to IP addresses, over 11 million references to hashes, and 8.2 million references to cyber attack events. This is the wealth of data on which we base our threat intelligence analyses in this report.



A Journey to the Dark Side

What does the linkage into the Dark Web look like, in reality? We used the Recorded Future index to investigate this. Recorded Future collects and analyzes Surface Web sources, and its index also contains data from forums, blogs, social media, and paste sites that we expect to contain both suspect or threat related content and links to other parts of the Internet (e.g., TOR sites).

As an initial example, we used the TOR Uncensored Hidden Wiki index (http://zqktlwi4fecvo6ri.onion/wiki/index.php/Main_Page) to manually locate a dubious reseller of credit cards (Premium Cards, http://slwc4j5wkn3yyo5j.onion/):



We are offering top quality cards:

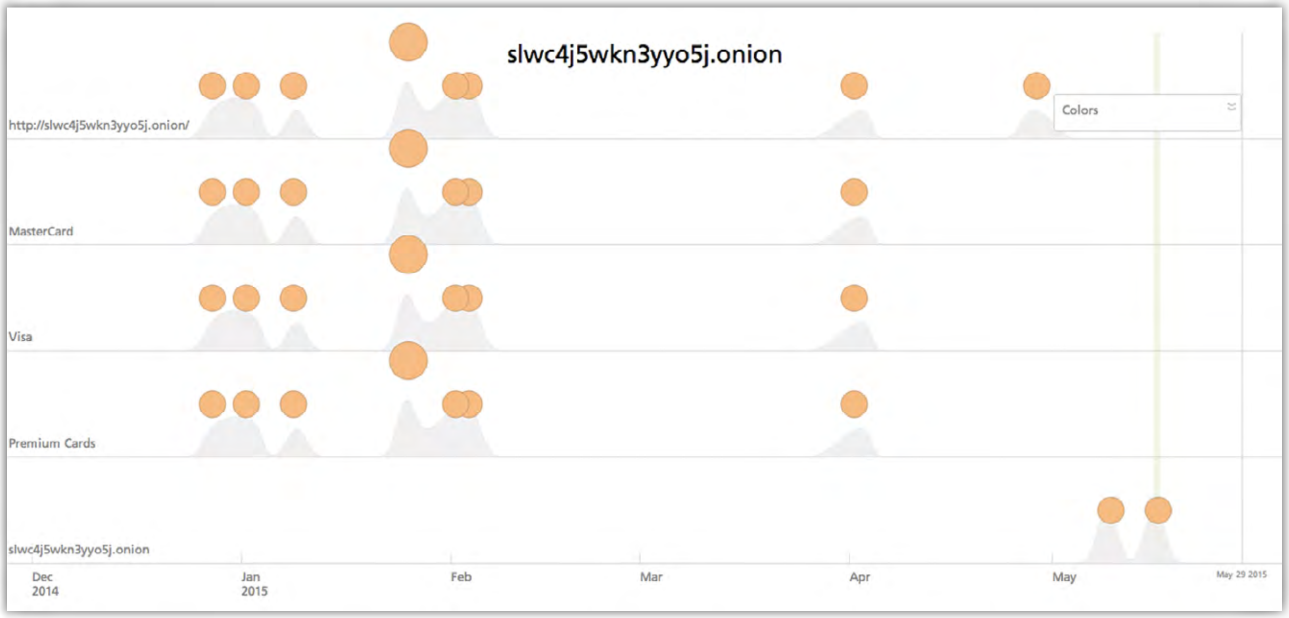
All our cards come with PINs and instructions. You can use them at any ATM worldwide.
Our cards are equiped with magnetic strip and chip.
Once you purchase, we will email you a Full Guide on how to safely cash out.

Us cards - available balance $2,500(minimum) and up to $5,000.
usage:
✓ ATM
✓ Stores
✓ Online

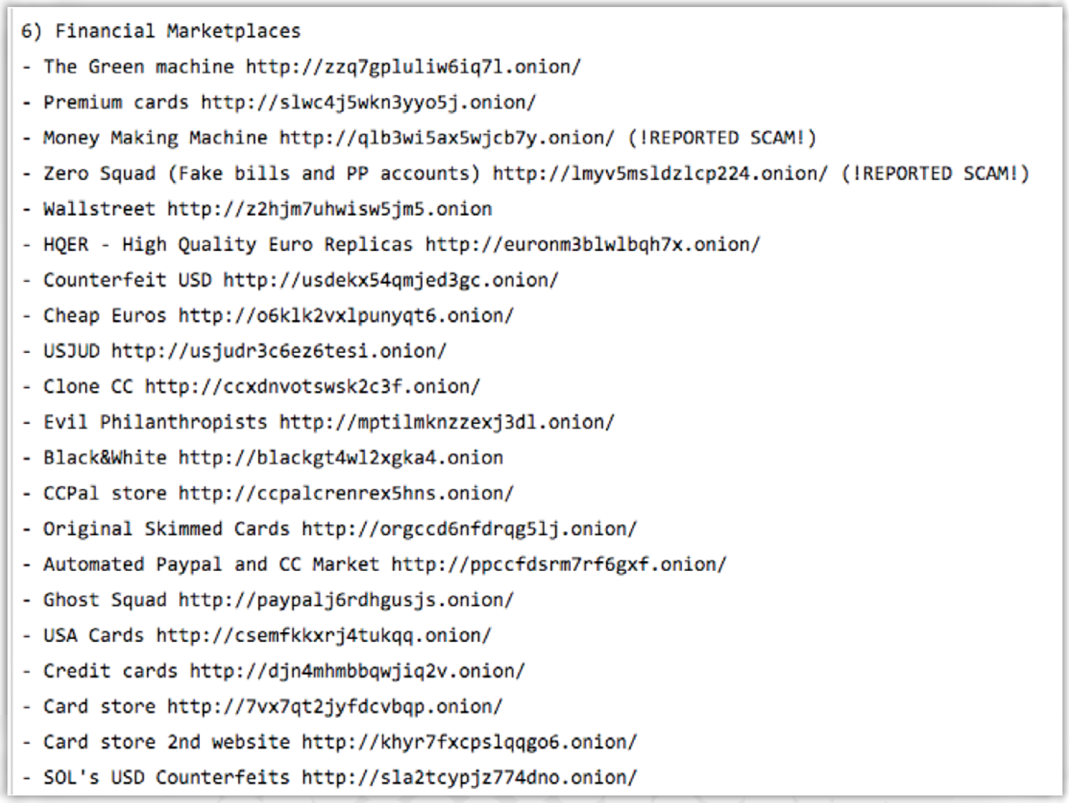
Eu cards - available balance 2,500 Euro(minimum) and up to 4,500 Euro.
usage:
✓ ATM
✓ Stores

Payment methods we accept:

We then queried the Recorded Future index for the Onion link to Premium Cards, and indeed found 14 references from the last 3.5 months:

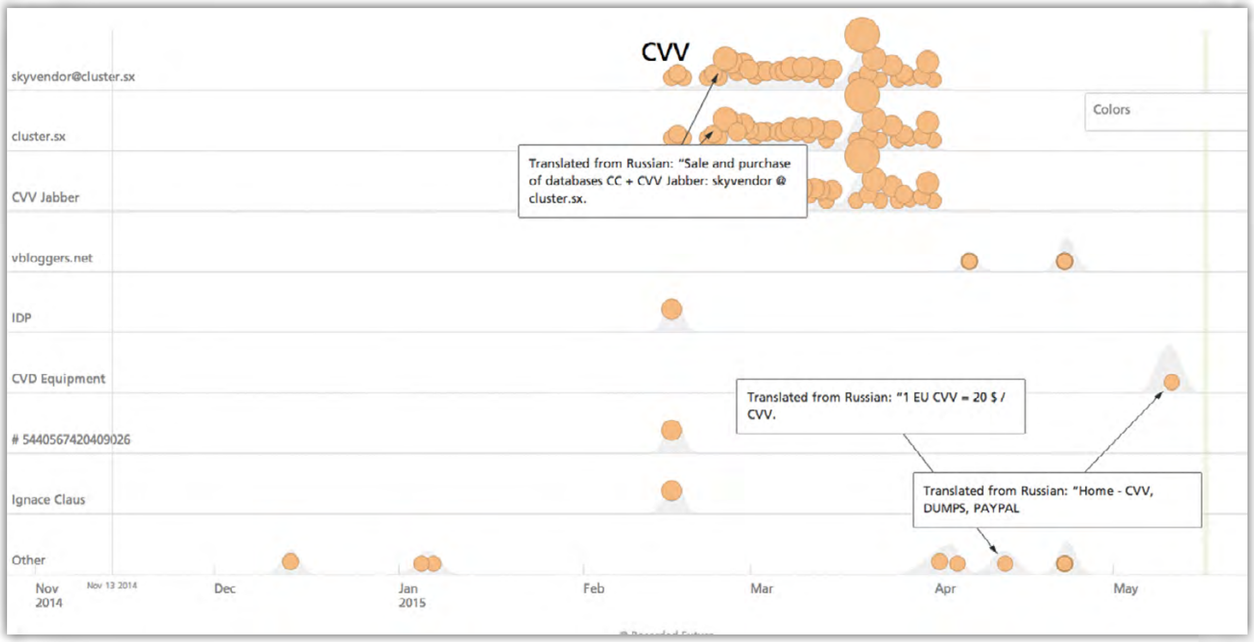


These references all come from Pastebin. One of the pastes, for example, provides an index to several useful "Financial Marketplaces":



```
6) Financial Marketplaces
- The Green machine http://zzq7gpluliw6iq7l.onion/
- Premium cards http://slwc4j5wkn3yyo5j.onion/
- Money Making Machine http://qlb3wi5ax5wjcb7y.onion/ (!REPORTED SCAM!)
- Zero Squad (Fake bills and PP accounts) http://lmyv5msldzlcp224.onion/ (!REPORTED SCAM!)
- Wallstreet http://z2hjm7uhwisw5jm5.onion
- HQER - High Quality Euro Replicas http://euronm3blwlbqh7x.onion/
- Counterfeit USD http://usdekx54qmjed3gc.onion/
- Cheap Euros http://o6klk2vxlpunyqt6.onion/
- USJUD http://usjudr3c6ez6tesi.onion/
- Clone CC http://ccxdnvotswsk2c3f.onion/
- Evil Philanthropists http://mptilmknzzexj3dl.onion/
- Black&White http://blackgt4wl2xgka4.onion
- CCPal store http://ccpalcrenrex5hns.onion/
- Original Skimmed Cards http://orgccd6nfdrqg5lj.onion/
- Automated Paypal and CC Market http://ppccfdsrm7rf6gxf.onion/
- Ghost Squad http://paypalj6rdhgusjs.onion/
- USA Cards http://csemfkkxrj4tukqq.onion/
- Credit cards http://djn4mhmbbqwjiq2v.onion/
- Card store http://7vx7qt2jyfdcvbqp.onion/
- Card store 2nd website http://khyr7fxcpslqqgo6.onion/
- SOL's USD Counterfeits http://sla2tcypjz774dno.onion/
```

As a second example, we investigated if illicit material was being marketed in sources that Recorded Future does harvest. Credit card information with CVVs is a good example of such material, and we focused on material published in 2015, and only in Russian. This yielded a small but interesting set of references related to advertising content and advice on how to obtain and use the stolen credit card information:

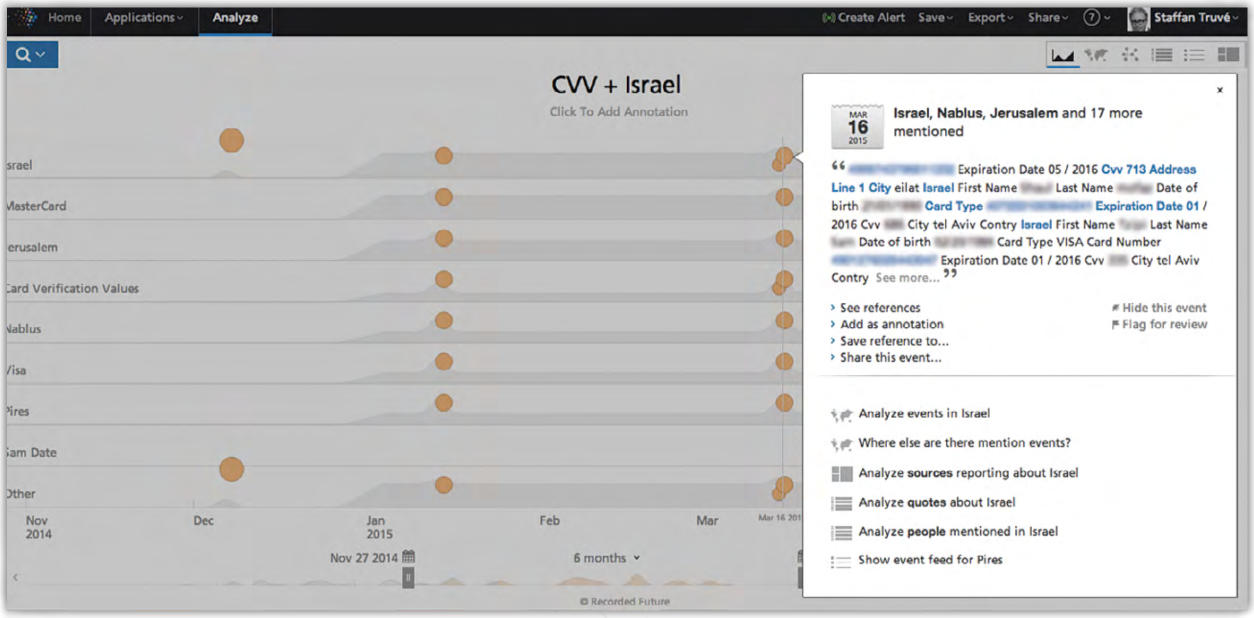


Translated from Russian: "Sale and purchase of databases CC + CVV Jabber: skyvendor @ cluster.sx.

Translated from Russian: "1 EU CVV = 20 $ / CVV.

Translated from Russian: "Home - CVV, DUMPS, PAYPAL

Being even more specific, we looked for CVVs of credit cards related to Israel:



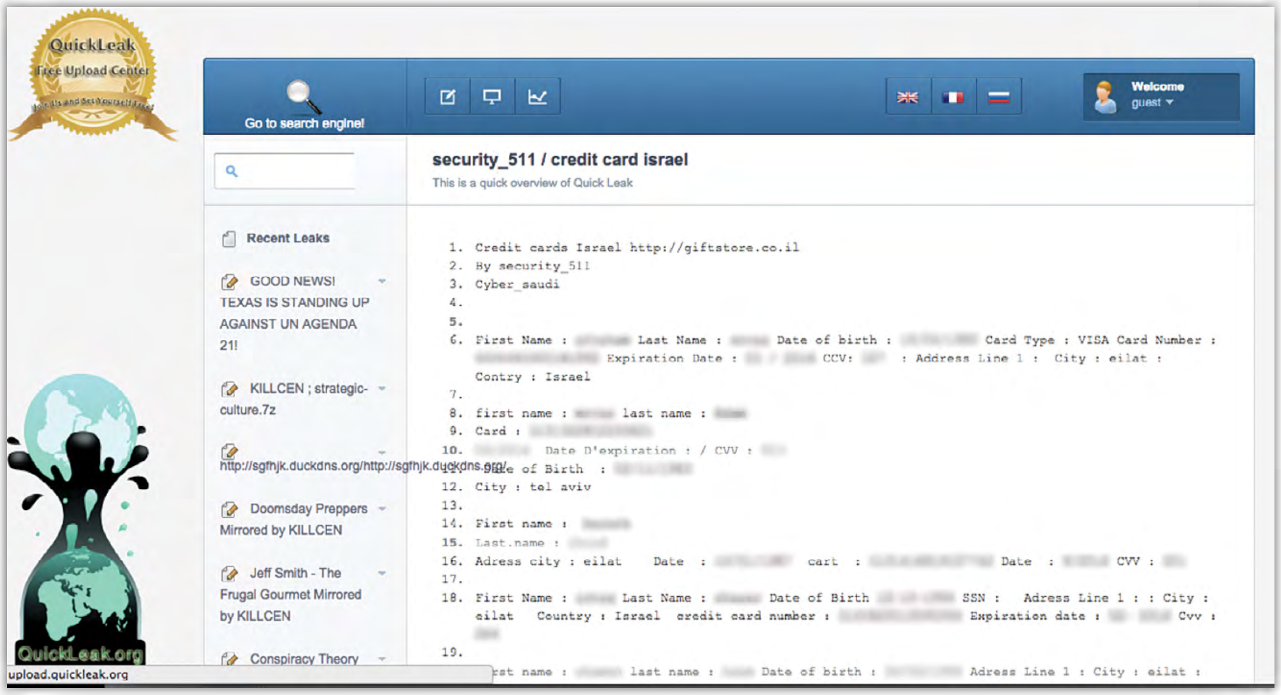
MAR 16 2015 **Israel, Nablus, Jerusalem** and 17 more mentioned

"[redacted] Expiration Date 05 / 2016 **Cvv 713 Address Line 1 City** eilat **Israel** First Name [redacted] Last Name [redacted] Date of birth [redacted] **Card Type** [redacted] **Expiration Date 01** / 2016 Cvv [redacted] City tel Aviv Contry **Israel** First Name [redacted] Last Name [redacted] Date of birth [redacted] Card Type VISA Card Number [redacted] Expiration Date 01 / 2016 Cvv [redacted] City tel Aviv Contry See more..."

- See references
- Add as annotation
- Save reference to...
- Share this event...

Hide this event
Flag for review

Analyze events in Israel
Where else are there mention events?
Analyze **sources** reporting about Israel
Analyze **quotes** about Israel
Analyze **people** mentioned in Israel
Show event feed for Pires


QuickLeak
Free Upload Center
Go to search engine!
Welcome
guest
Recent Leaks
GOOD NEWS! TEXAS IS STANDING UP AGAINST UN AGENDA 21!
KILLCEN ; strategic-culture.7z
http://sgfhjk.duckdns.org/http://sgfhjk.duckdns.org/
Doomsday Preppers Mirrored by KILLCEN
Jeff Smith - The Frugal Gourmet Mirrored by KILLCEN
Conspiracy Theory
QuickLeak.org
upload.quickleak.org

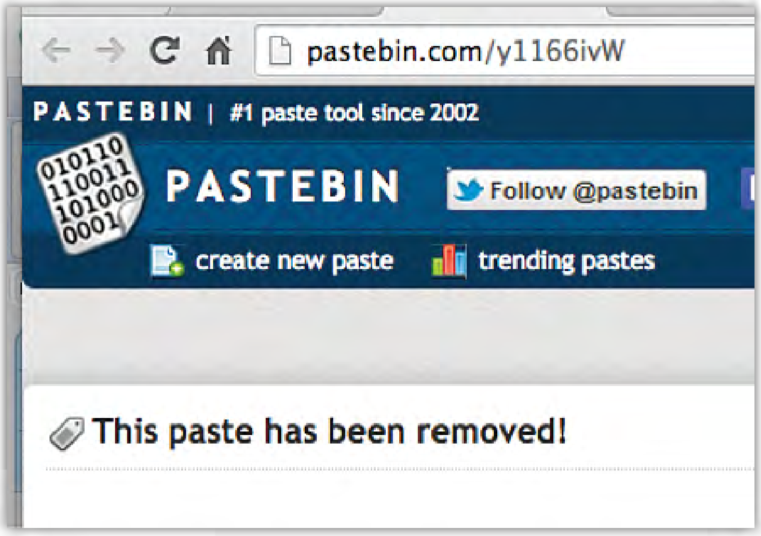
security_511 / credit card israel

This is a quick overview of Quick Leak

```
Credit cards Israel http://giftstore.co.il
By security_511
Cyber_saudi


First Name : [redacted] Last Name : [redacted] Date of birth : [redacted] Card Type : VISA Card Number :
[redacted] Expiration Date : [redacted] CCV: [redacted] : Address Line 1 :  City : eilat :
Contry : Israel

first name : [redacted] last name : [redacted]
Card : [redacted]
[redacted]  Date D'expiration : / CVV : [redacted]
Date of Birth  : [redacted]
City : tel aviv

First name : [redacted]
Last.name : [redacted]
Adress city : eilat   Date  : [redacted]  cart  : [redacted] Date  : [redacted] CVV : [redacted]

First Name : [redacted] Last Name : [redacted] Date of Birth [redacted] SSN :  Adress Line 1 : : City :
eilat  Country : Israel  credit card number : [redacted] Expiration date : [redacted] Cvv :
[redacted]

rst name : [redacted] last name : [redacted] Date of birth : [redacted] Adress Line 1 : City : eilat :
```

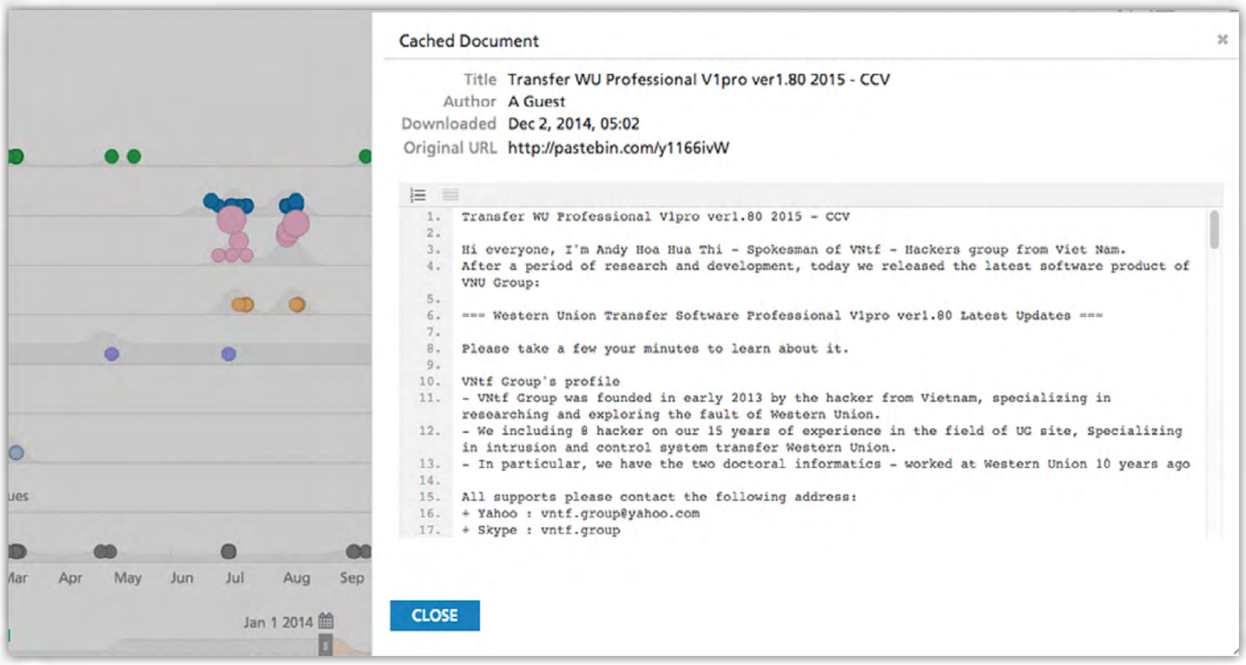
Thus, there is no doubt illicit material is being marketed not only on the Dark Web but also on other channels such as paste sites and forums.

Some of this content is nefarious enough to get quickly removed, even from Pastebin:



This paste has been removed!

In these cases, it is convenient that Recorded Future provides cached access to paste content we have harvested (NOTE: this feature is available only to registered Recorded Future clients):



Title Transfer WU Professional V1pro ver1.80 2015 - CCV
Author A Guest
Downloaded Dec 2, 2014, 05:02
Original URL http://pastebin.com/y1166ivW

```
Transfer WU Professional V1pro ver1.80 2015 - CCV

Hi everyone, I'm Andy Hoa Hua Thi - Spokesman of VNtf - Hackers group from Viet Nam.
After a period of research and development, today we released the latest software product of
VNU Group:

=== Western Union Transfer Software Professional V1pro ver1.80 Latest Updates ===

Please take a few your minutes to learn about it.

VNtf Group's profile
- VNtf Group was founded in early 2013 by the hacker from Vietnam, specializing in
researching and exploring the fault of Western Union.
- We including 8 hacker on our 15 years of experience in the field of UG site, Specializing
in intrusion and control system transfer Western Union.
- In particular, we have the two doctoral informatics - worked at Western Union 10 years ago

All supports please contact the following address:
+ Yahoo : vntf.group@yahoo.com
+ Skype : vntf.group
```

Links From the Surface to the Dark Web

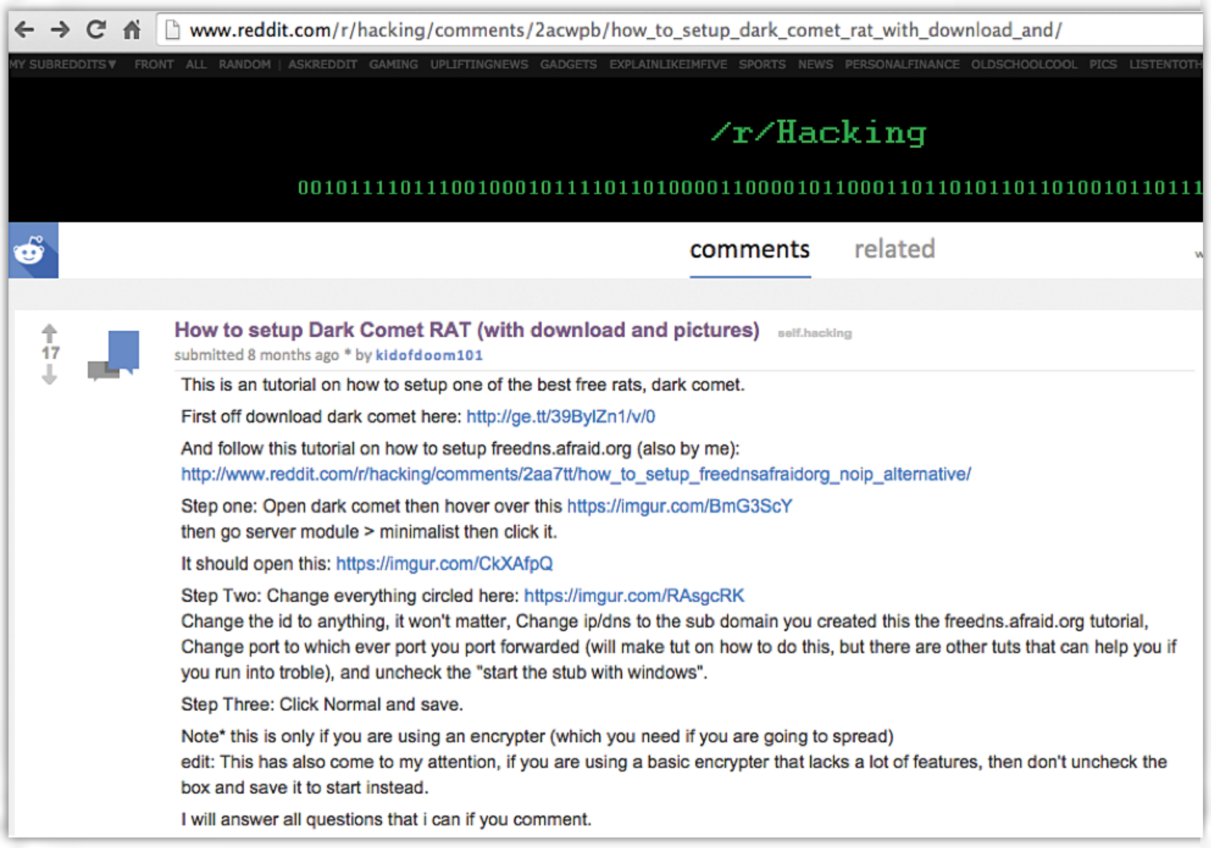
Inspired by the discoveries above, we investigated the linkage from Twitter and Pastebin to TOR/Onion links. It turns out to be fairly low volume: out of 509 million tweets, about 65 million had cyber related content published in Q1 2015[6] there were 37 million URLs, but only 499 of those were Onion links. As another example, of 6.7 million Pastebin documents from 2015 Q1, with 226 million references in total, there were 8,316 Onion links, but only 1,036 unique links (the links with the most references were to index pages, adult comics, and sellers of cannabis, passports, and ID cards). In general, the number of links to TOR was low in volume, but some of them were high value.

The Malware Marketplace

We have shown how stolen financial credentials are marketed, but what about tools used by cyber criminals – can those also be found in this borderland?

In some cases the answer is a straightforward "yes." To download a Remote Access Trojan (RAT) like DarkComet, just Google for instructions and download sites:

[6] These are not all cyber related tweets for that time period, but a subset selected by Recorded Future filters.


www.reddit.com/r/hacking/comments/2acwpb/how_to_setup_dark_comet_rat_with_download_and/
MY SUBREDDITS ▾ FRONT ALL RANDOM | ASKREDDIT GAMING UPLIFTINGNEWS GADGETS EXPLAINLIKEIMFIVE SPORTS NEWS PERSONALFINANCE OLDSCHOOLCOOL PICS LISTENTOTH
/r/Hacking
0010111101110010001011110110100001100001011000110110101101101001011011
comments
related
17

How to setup Dark Comet RAT (with download and pictures) self.hacking

submitted 8 months ago * by kidofdoom101

This is an tutorial on how to setup one of the best free rats, dark comet.

First off download dark comet here: http://ge.tt/39ByIZn1/v/0

And follow this tutorial on how to setup freedns.afraid.org (also by me):
http://www.reddit.com/r/hacking/comments/2aa7tt/how_to_setup_freednsafraidorg_noip_alternative/

Step one: Open dark comet then hover over this https://imgur.com/BmG3ScY
then go server module > minimalist then click it.

It should open this: https://imgur.com/CkXAfpQ

Step Two: Change everything circled here: https://imgur.com/RAsgcRK
Change the id to anything, it won't matter, Change ip/dns to the sub domain you created this the freedns.afraid.org tutorial, Change port to which ever port you port forwarded (will make tut on how to do this, but there are other tuts that can help you if you run into troble), and uncheck the "start the stub with windows".

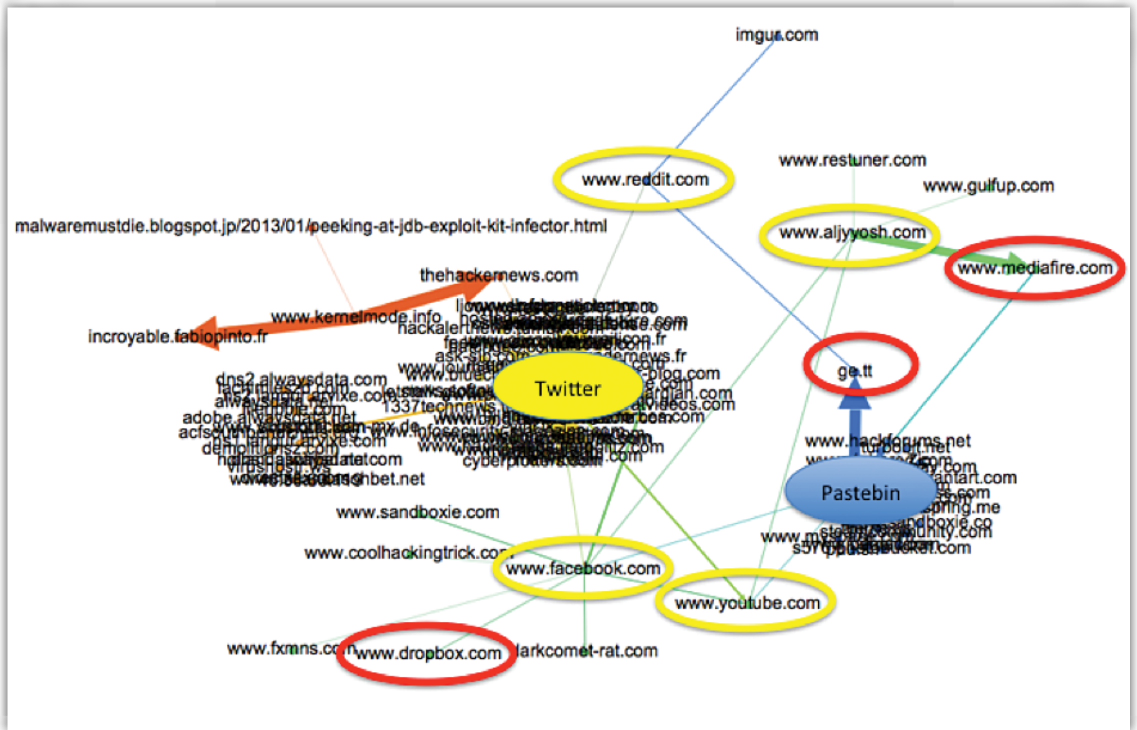
Step Three: Click Normal and save.

Note* this is only if you are using an encrypter (which you need if you are going to spread)
edit: This has also come to my attention, if you are using a basic encrypter that lacks a lot of features, then don't uncheck the box and save it to start instead.

I will answer all questions that i can if you comment.

To get a bigger picture of where DarkComet is being distributed and discussed, we extracted all links in documents related to it for a three-month period, using the Recorded Future API, and visualized the resulting links using the open source graph visualization tool Gephi[7]:

[7] http://gephi.github.io/



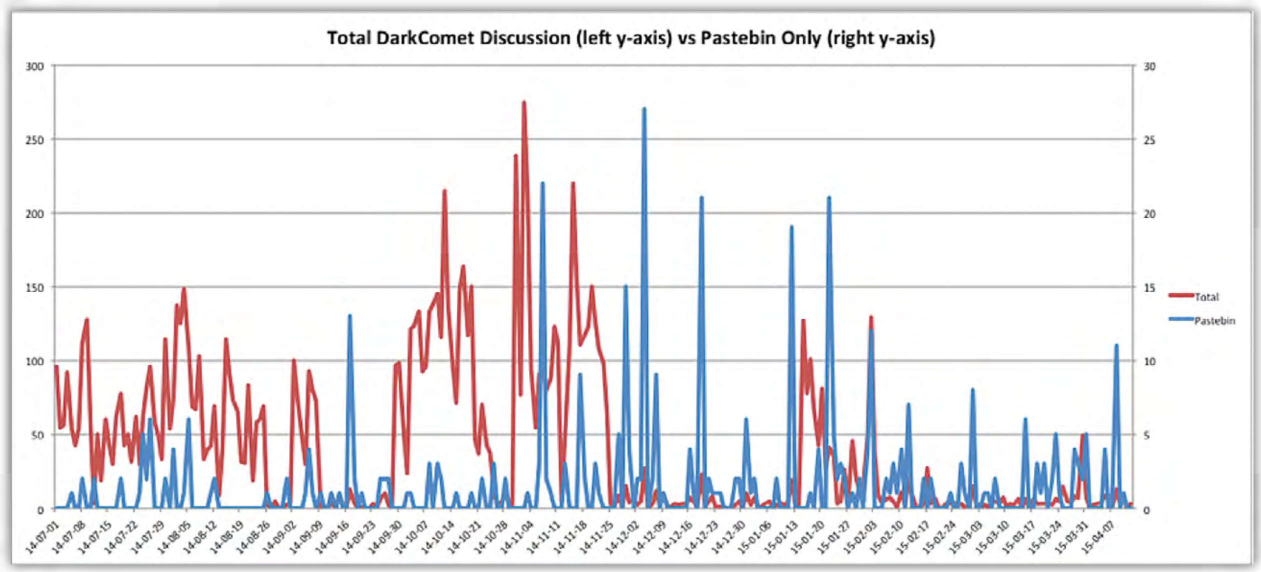
This graph illustrates the different kind of sites where malware is mentioned or found:

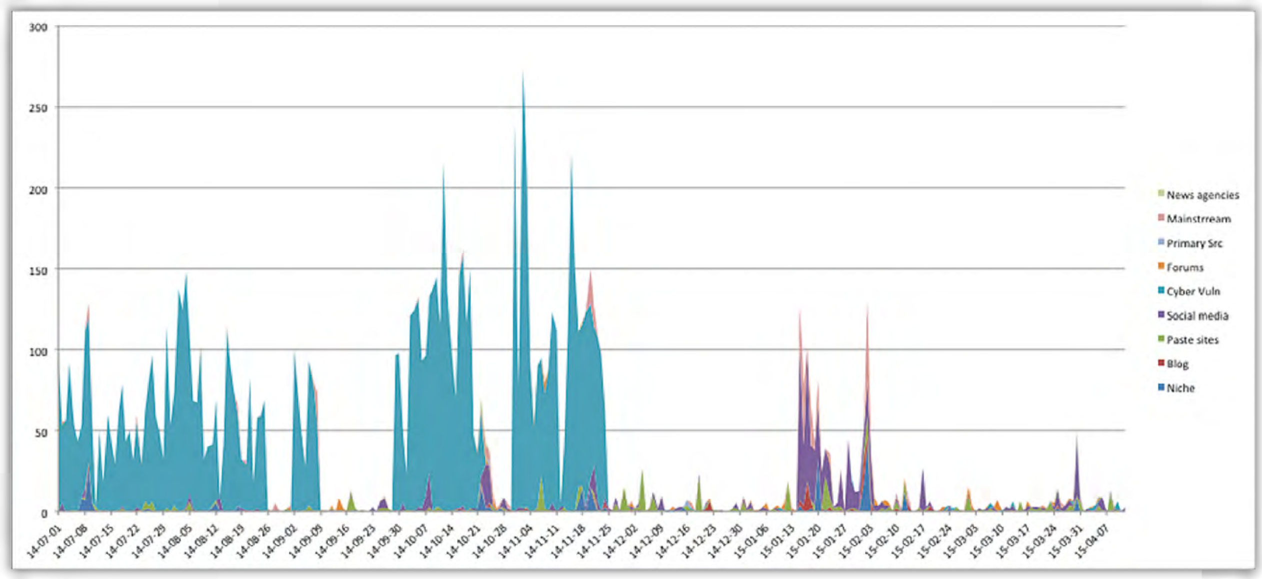
- General discussion forums (marked by yellow in the graph), including Facebook, Reddit, Twitter, and YouTube. Here, general discussions about a malware take place, and a lot of the traffic is related to security companies and general warnings about a new threat.
- More specialized forums, where hackers ask questions about how to find, download, modify, and use a malware. The Aljyyosh.com site is a good example of such a site.
- Repositories where malware can be found and downloaded. These are marked by red ovals and include download and content distribution sites such as Dropbox, ge.tt, and Mediafire.

Social media sites and forums thus act as the marketing channels for the download sites where malware and related services can be found.

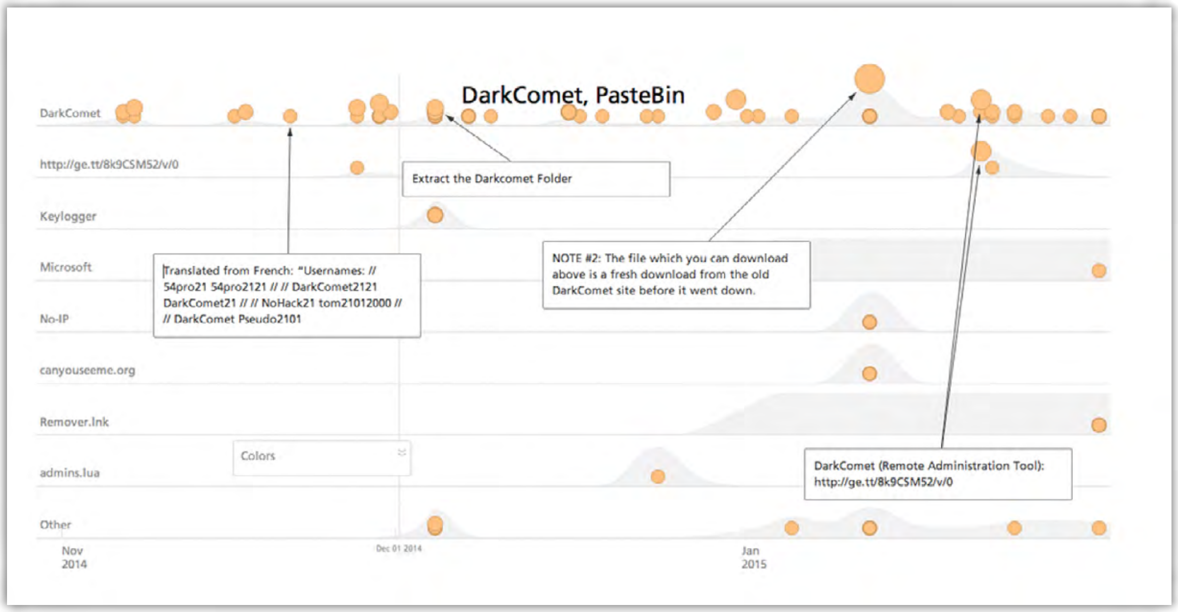
Dark Marketing Trends?

To see if sites like Pastebin can be an indicator of increased interest, and thus increased threat, from a specific Malware we looked at the total discussion around DarkComet vs. the discussion on Pastebin for nine months beginning on July 1st 2014; the chart below breaks up the total count into different media types (all data extracted using the Recorded Future API):





During 2014, the discussion was mostly active on sites related to cyber vulnerability conversations. In January 2015 the discussion shifted over to social and mainstream media, mostly due to the discussions around the use of this Malware in connection to the Charlie Hebdo events. There was actually an increase in mentions of DarkComet on Pastebin in late November and December 2014. They are small in number, but the mentions which do exist are very instructive, as the following screenshot illustrates:



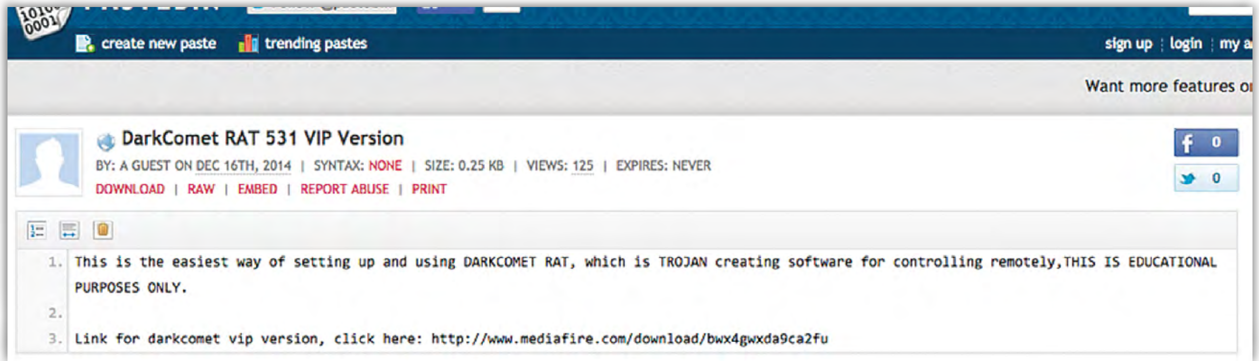
Extract the Darkcomet Folder

Translated from French: "Usernames: // 54pro21 54pro2121 // // DarkComet2121 DarkComet21 // // NoHack21 tom21012000 // // DarkComet Pseudo2101

NOTE #2: The file which you can download above is a fresh download from the old DarkComet site before it went down.

DarkComet (Remote Administration Tool): http://ge.tt/8k9CSM52/v/0

Here are a few of the sites linked to from Pastebin - note that these are instructions for how to download and set up DarkComet:

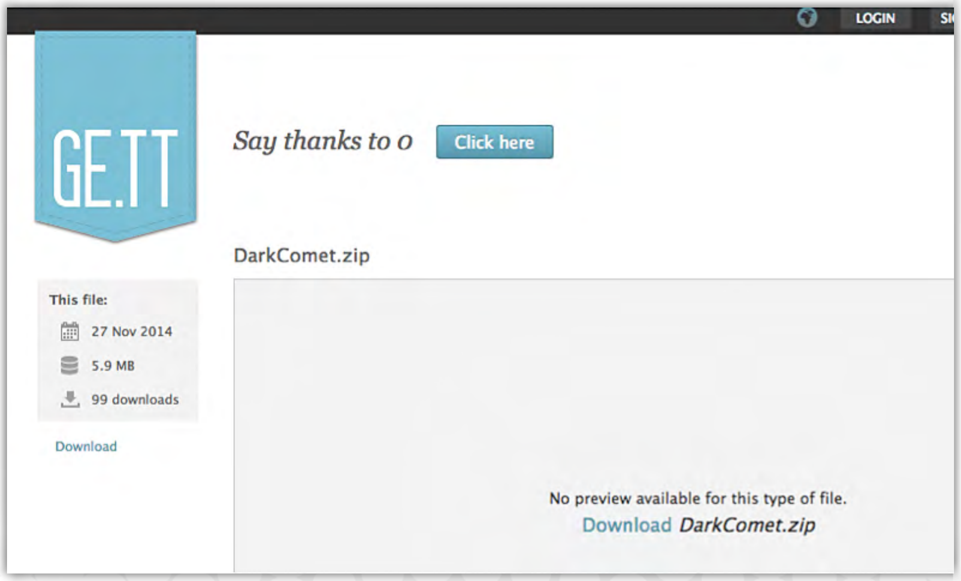


DarkComet RAT 531 VIP Version

BY: A GUEST ON DEC 16TH, 2014 | SYNTAX: NONE | SIZE: 0.25 KB | VIEWS: 125 | EXPIRES: NEVER

DOWNLOAD | RAW | EMBED | REPORT ABUSE | PRINT

```
This is the easiest way of setting up and using DARKCOMET RAT, which is TROJAN creating software for controlling remotely,THIS IS EDUCATIONAL PURPOSES ONLY.

Link for darkcomet vip version, click here: http://www.mediafire.com/download/bwx4gwxda9ca2fu
```



DarkComet.zip

This file:

27 Nov 2014

5.9 MB

99 downloads

Download

No preview available for this type of file.

Download *DarkComet.zip*

In addition to showing increased interest in DarkComet, the growing amount of mentions also indicates usage migrating from higher risk threat actors to "garden variety" threat actors who source their malware tools from Pastebin.

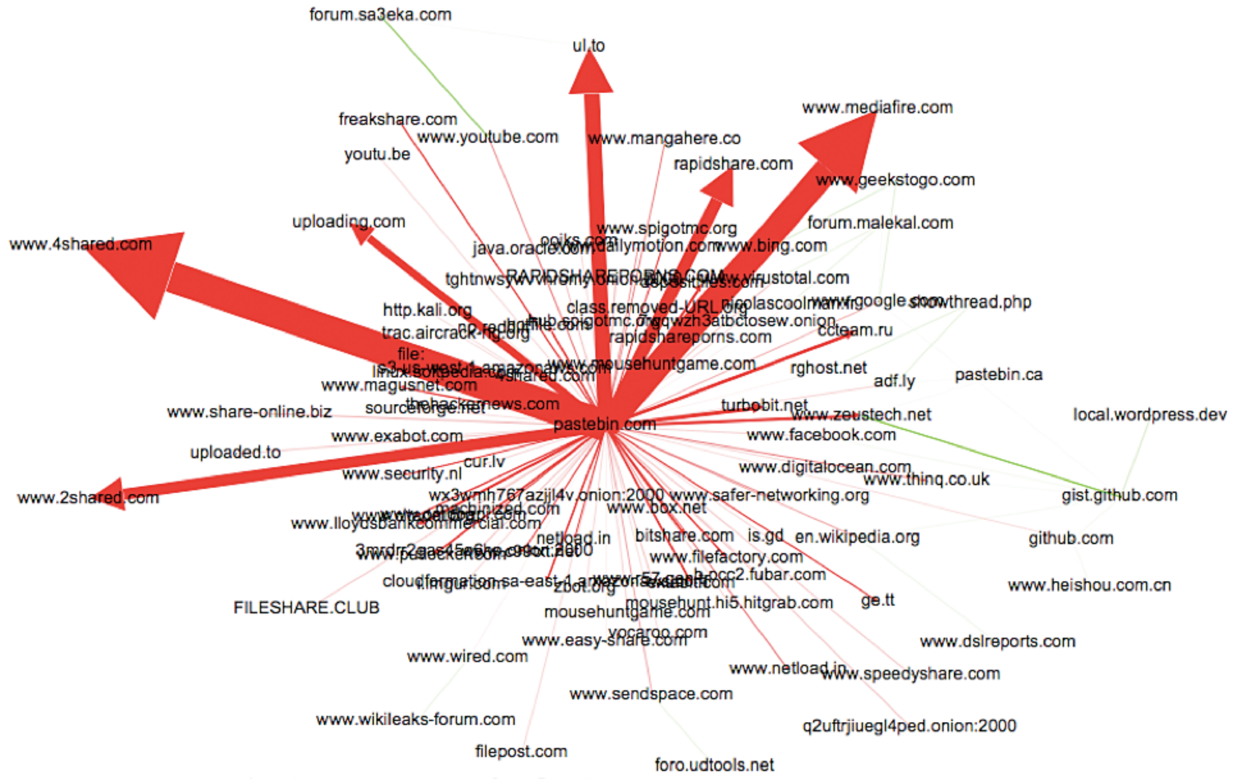
Link Patterns

Next, we examined all links from texts on paste sites and forums for a period of 3.5 months that contained a reference to malware and had a link to some other site, which we evaluated to see where the link was directed. Below are the top link targets. If we compare this list with a list of popular file sharing sites for general content, such as http://www.ebizmba.com/articles/file-sharing-websites, we see a mix of "general" file sharing sites and some clearly more focussed on shady material. We also note that some very popular file sharing sites, like Dropbox, are missing from the top link list.

Destination Site	Count	Position On Top List
www.4shared.com	3469	3
www.mediafire.com	2463	2
rapidshareporns.com	1239	
www.2shared.com	1206	
uploading.com	1153	
turbobit.net	898	
ul.to	824	
rapidshare.com	709	14
www.easybytez.com	646	
fileshare.club	547	
hotfile.com	547	
www.jeuxvideo.com	329	
bitshare.com	327	
www.juanmata10.com	260	
depositfiles.com	245	
salefiles.com	220	
www.example.com	215	
www.netload.in	212	
noc.yartv.ru	201	
netload.in	196	
pastebin.com	179	
extabit.com	173	
www.putlocker.com	163	
www.exploit4arab.net	157	

tech4all.criativin.com.br	156	
www.youtube.com	154	
github.com	150	
www.gov.ai	147	
www.owasp.org	143	
filepost.com	140	
hosting.risp.ru	138	
pan.baidu.com	132	
www.exploit-db.com	130	
freakshare.com	120	
www.zeustech.net	119	
www.voxility.com	117	

As seen, again a majority of the link destinations are file sharing sites of different kinds, showing that discussions around malware on these sites tend to be accompanied with links where other content can be downloaded. This graph illustrates the link pattern, and Pastebin is the main source of links:



Conclusions

There are clear borders between the Surface, Deep, and Dark Web in terms of accessibility and tools, but there exists information on the Surface Web and on the Deep Web that can be used to gain important understanding of what is happening on the Dark Web. Simple marketing mechanics underlies this – when something needs to be sold, prospective customers need to be able to find information about it quickly. The available information includes topics, link patterns, and activity levels.

As illustrated by the study of mentions of the DarkComet malware, sites such as Pastebin act as a marketing channel by providing a fairly unregulated place for posting both instructions and links to download sites for malware. Using a threat intelligence platform to monitor the activity on paste sites can therefore be a good way to get early warning signals for increased use of certain kind of malware and stolen data or credentials.

Topics also tend to migrate over time, from Dark to Surface Web, and analyzing these patterns allows us to understand when high end malware tools are becoming commodity malware. Such a shift means the volume of attacks using the commodity malware will increase, but the average skill level of attackers will go down - and the highly skilled attackers will have moved on to using another tool.

About Recorded Future

We arm you with real-time threat intelligence so you can proactively defend your organization against cyber attacks. With billions of indexed facts, and more added every day, our patented Web Intelligence Engine continuously analyzes the entire Web to give you unmatched insight into emerging threats. Recorded Future helps protect four of the top five companies in the world.

Recorded Future, 363 Highland Avenue, Somerville, MA 02144 USA |