



LEADERSHIP FOR IT SECURITY & PRIVACY ACROSS HHS

HHS CYBERSECURITY PROGRAM

OFFICE OF INFORMATION SECURITY



The Dark Web and Cybercrime

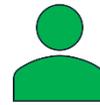
07/23/2020



- Dark Web Background
 - What is the Dark Web?
 - What is Tor?
 - Is the Dark Web Synonymous with Crime?
 - What Kind of Criminal Activity Occurs on the Dark Web?
 - What Sites Exist on the Cybercriminal Dark Web?
 - Forums vs Markets
 - The Life Cycle of Stolen Data
- Case Study
 - Incident Overview
 - Site Overview
 - Actor Overview
 - Incident Timeline
 - Sample Data Overview
 - Incident Takeaways



Slides Key:



Non-Technical: managerial, strategic and high-level (general audience)



Technical: Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)

What is the Dark Web?



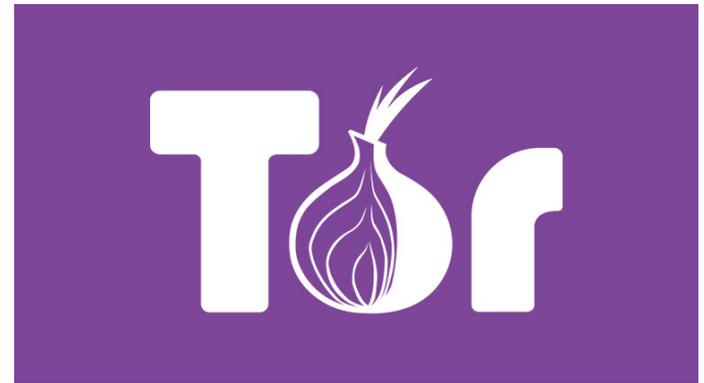
- Technically, overlay networks that use the Internet and require specific software or credentials to access.
- Surface web: indexed by Google, does not require special software or credentials to access
 - HHS.gov
- Deep web: not indexed by Google, requires special software or credentials to access:
 - HHS's internal SharePoint, a bank account portal
- Dark web: requires Tor Browser, may require additional credentials, all Tor urls end in .onion
 - Dread (dark web forum), dreadditevelidot[.]**ONION**
 - **Note: do not attempt to visit this site on a corporate network**



What is Tor?



- Created by the U.S. Naval Research Lab in 1995
- The Tor Project (nonprofit) created in 2006
- Privacy focused internet browsing and site hosting
- Route traffic through multiple nodes and encrypt at every step of the way
 - Layers of encryption are compared to an onion, hence **The Onion Router** and the top level domain **.onion**



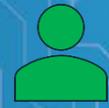
Is the Dark Web Synonymous with Crime?



- Many people use the dark web for totally legitimate reasons – political dissidence, private communication, etc
- Many people also use the dark web because of the cybercriminal communities that thrive there
 - Silk Road (and Silk Road 2.0, 3.0, etc), Alphabay, Hansa, Dream, etc
- Many of those cybercriminal communities also use surface web sites or other privacy focused hosting solutions (I2P, etc.)
 - Colloquially, “the dark web” sometimes refers to cybercriminal communities that use these other methods
 - For example, some security researchers would consider the surface web (.com) site Raid Forums or RAID to be part of the dark web even though it is not a .onion



What Kind of Criminal Activity Occurs on the Dark Web?



- Famous for narcotics
 - While many of the most famous dark web marketplaces were primarily drug marketplaces, these sites are not particularly relevant for our purposes
 - The exception may be pharmaceutical sales, which can be addressed in a later presentation
- Huge ecosystem for payment card fraud and identity theft
 - Sites that exist only to sell payment cards often have thousands to millions of cards in stock
 - Many of these sites also sell “fullz” or full identity packs for identity theft purposes
- Cybercrime and “Cybercrime-as-a-Service”
 - Economy of tools/raw supplies to commit cybercrime
 - Spinoff services of experts act as “hackers for hire” for less experienced actors

<https://www.bbc.com/news/technology-22381046>, <https://acwi.org/2018/12/06/credit-card-fraud-sees-resurgence/>,
<https://affant.com/cybercrime-as-a-service-goes-mainstream/>



What Sites Exist on the Cybercriminal Dark Web?



- Focus on forums and marketplaces
- Both sites may have different barriers to entry
 - Invite only
 - Particular nationality/political alignment (Commonwealth of Independent States -aligned)
 - Entry price
 - Must be vouched for
 - Provide proof of crimes committed
- May focus on drugs/contraband or stolen data/cybercrime/fraud, but generally not both





Forums

- May be used to coordinate sales, no ecommerce function
 - Difficult to track sales
- Discussion focused
- Share wisdom, tactics, techniques, and procedures, etc
- Community-led discussion

Marketplaces

- Ecommerce site similar to those you might find on the surface web
 - Buyers can rate sellers
 - Site generally has escrow system
 - More susceptible to shutdown due to exit-scamming or law enforcement action
- May have a partner forum for discussion or internal message function



- Scams – between users, between users and site administrators, between buyers and sellers – abound
- Credible accusations of scamming or “ripping” can result in bans and ostracization
- Site admission policies and reputation points are used to keep bad actors out of sites and evaluate the behavior of users on specific sites
- Actor establish personas across long periods of time and multiple sites to show their credibility
- Networks of actors across sites can distribute stolen data widely



The Life Cycle of Stolen Data



- Stolen data tends to filter down through communities, eventually landing in open forums or large marketplaces
- Data is sold and resold, traded and re-traded, repackaged, many times
- One potential life cycle
 - Traded between close associates or sold to known buyers
 - Posted for sale in closed forums with high barriers to entry
 - Posted for sale in closed forums with lower barriers to entry
 - Posted for sale on multi-good marketplaces
 - Posted for free on forums
 - Posted for free on paste sites



<https://www.lokad.com/supply-chain-management-definition>





Security researchers use context about sites, actors, and markets to evaluate and respond to content on these sites.





What Happened:

On May 6, 2020, Raid Forums user greenmoon2019 posted in the site's sample section an unlockable link to 100,000 medical records with dates of birth (DOBs) and a specific medical identifier number linked to a healthcare entity. On May 11, 2020, the entity confirmed that this dataset did not contain valid data. On May 13, the actor removed the post.

Why Does It Matter:

This incident illustrates several key principles that can be applied in future incidents (and when live data does appear)

1. **Cyber criminals may not accurately identify data**
2. **Understanding the site, actors, and context matters**
3. **Quick incident response – and teamwork – make a difference**





Raid Forums (RAID)

- Surface web underground hacking forum
- Founded in 2015
- Hosts discussion of hacking topics, advertisements and solicitations of leaked or cracked databases, and provides a master list of all data shared on the site
- No ecommerce functionality, although vendors use the site's private message features to coordinate sales
 - Not clear what has been sold or who buys it
- Semi-public
 - Some parts of the site can be accessed without creating a free account
 - Registering with the site unlocks some content
 - Site credits unlock stolen datasets and can be purchased from the site directly or earned through posting and commenting
- Low barrier to entry
- Reputation points:
 - interactions with other users
 - Positive reputation: hundreds to thousands of points
 - Negative reputation may result in a ban



Above: Raid Forums Logo



Threat Actor greenmoon2019

- Joined RAID on January 5, 2019
- Internal and external analysts assess this actor's reliability as a "B" – usually reliable.
- On May 6, 2020 had 254 reputation points
 - Posts generally well received
 - No forum members had accused this actor of scamming or "ripping."
 - No identified profiles or aliases of this actor on other surface or dark web sites.
- History of posting free samples of databases
 - Mostly not healthcare/HPH related
 - Two that were HPH related (addressed on next slide)
- Previously sought or sold phone, mortgage, and other consumer records for residents of U.S., Canada, New Zealand





Threat Actor greenmoon2019

- History of posting free samples of databases, including two HPH databases in September 2019
- Actor posted 100,000 records from a “Premium Health Insurance Long form database... Total 4 Million Data available.”
 - This actor advertised the dataset as containing the following fields:
"IP_Address", "INCOMENUMBER", "Number_Of_Applicants", "First_Name", "Last_Name", "Address", "City", "State", "Zip", "Email", "Day_Phone", "Household_Income", "Household_People", "Gender", "DOB", "Height_Feet", "Height_Inches", "Weight", "Age", "Pregnant", "Health_Conditions", "Tobacco", "Currently_Covered", "Coverage_Denied", "Currently_Employed", "Insurance_Company", "Conditions", "Diabetic", "Hospitalized_Last_5_Years", "Prescription_Medication", "Employment_Status", "Spouse_Gender", "Spouse_Height_Feet", "Spouse_Height_Inches", "Spouse_Weight", "Spouse_DOB", "Spouse_Health_Conditions", "Spouse_Conditions", "Child_1_Gender", "Child_1_Height_Feet", "Child_1_Height_Inches", "Child_1_Weight", "Child_1_DOB", "Child_1_Health_Conditions", "Child_1_Conditions", "Child_2_Gender", "Child_2_Height_Feet", "Child_2_Height_Inches", "Child_2_Weight", "Child_2_DOB", "Child_2_Health_Conditions", "Child_2_Conditions", "Child_3_Gender", "Child_3_Height_Feet", "Child_3_Height_Inches", "Child_3_Weight", "Child_3_DOB", "Child_3_Health_Conditions", "Child_3_Conditions", "Child_4_Gender", "Child_4_Height_Feet", "Child_4_Height_Inches", "Child_4_Weight", "Child_4_DOB", "Child_4_Health_Conditions", "Child_4_Conditions", "Child_5_Gender", "Child_5_Height_Feet", "Child_5_Height_Inches", "Child_5_Weight", "Child_5_DOB", "Child_5_Health_Conditions", "Child_5_Conditions", "Spouse_Tobacco", "Child_1_Tobacco", "Child_2_Tobacco", "Child_3_Tobacco", "Child_4_Tobacco", "Child_5_Tobacco", "Dental_Term_Length", "Health_Policy_ID", "Vision_Policy_ID", "Dental_Policy_ID", "Agent_Disposition", "State2", "Income2", "Ehealth_Income", "Email_OptIn", "household_income_revalue", "Qualifying_Life_Event_Type"



Threat Actor greenmoon2019

- Actor also posted a 100,000 record sample of “US Ailment data.”
 - Ailment databases allow threat actors to target individuals with certain medical conditions
 - The data lists consumer PII alongside any ailments or medical conditions the individual suffers from.
 - This data was allegedly of the format: (Header: FirstName,LastName,Address,City,State,Zip,Gender,Age,Phone,Ailment).
- Other users praised the quality of both datasets
- On May 14, 2020, actor posted an advertisement for 21 U.S. and Canadian consumer databases, including datasets above
 - Claims that the databases are “exclusive and cleaned.”
 - This could indicate that, while users downloaded the 100,000 samples provided on previous posts, the actor has not successfully sold the complete databases to any buyers.



Incident Timeline



May 6

- Actor posts advertisement for medical data on RAID

May 7

- Analysts discover RAID post
- Begin internal investigation by alerting affected entity

May 8

- Sample of 100,000 records downloaded and sent to affected entity for analysis

May 11

- Affected entity confirms that the data is not valid

May 13

- Actor removes advertisement and sample data from RAID following criticism from multiple users about data quality

May 14

- Actor posts advertisement for 21 databases, including Health Insurance Long Form database and Ailment list



Sample Data Overview



- Original post provided five sample records for free, with 100,000 sample records available to download in exchange for eight site credits
- Format: phone1 firstname lastname address1 city state zip email dob gender primarypolicy primarypolicynumber
- Analysis of the 100,000 downloaded records revealed:
 - Data included entity-specific identifier numbers
 - The affected entity identified 4,078 valid identifiers, but only six identifiers accurately matched to the correct last name.
 - The six records with matching identifiers and surnames include relatively common surnames: Adams, Allan, Harrison, Murphy, Smith, and Williams.
 - No other demographic data associated with the record matched. These matches were false positives rather than indicators of valid records.
 - Analysts did not identify valid identifiers for 95,933 records.
 - Several identifier numbers contained characters that the affected entity confirmed do not appear in valid identifiers.
- Comparison of records against open sources identified actual individuals that fit the demographics of the alleged data
 - These records did not contain valid identifiers





Cyber criminals may not accurately identify data

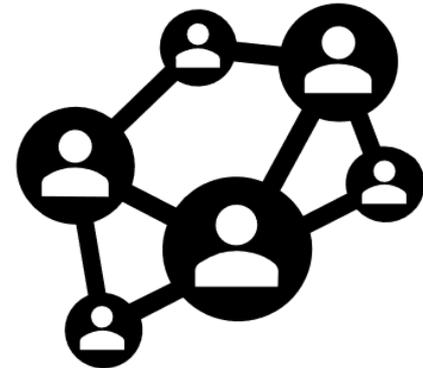
- This actor claimed that they acquired the fake data from a third party reseller
 - Stolen data is a commodity market
 - Reselling is common and follows a “trickle down” pattern
- While it appeared to be data from this healthcare entity – and may have been actual data of American citizens – it didn’t stand up to scrutiny
- Do not assume that an actor knows the origin of stolen data





Understanding the site, actors, and context matters

- Familiarity with the standards and etiquette of a site provides context to posts
 - The higher the barrier to entry of a site, the more likely information is to be legitimate (or that the actor *believes* it is legitimate)
 - Heavily moderated sites are less likely to host scammers
- Identify other aliases and past behavior of the actor
 - Is the actor active on other related sites?
 - What is the actor's reputation?
 - How long has the actor been a member of this site?
 - Has the actor previously posted similar content?
- Other context can be helpful when evaluating an incident or threat actor
 - Repeat interactions with other users
 - Credible accusations of scamming or "ripping"
 - Repeat interactions with moderators or other authority figures





Quick incident response – and teamwork – make a difference

- Ability to verify is important
 - Because analysts were able to work with the affected entity and provide data quickly, the affected entity was able to identify the data as fake
 - While evaluating context is important, all data should be treated as genuine until proven otherwise
- Post was removed without incurring media attention or panic
- Threat actor can be monitored going forward





Reference Materials

References



- The Untold Story of Silk Road, Wired
 - <https://www.wired.com/2015/04/silk-road-1/>
- Stolen credit card info on the dark web tripled in 6 months, Yahoo
 - <https://www.yahoo.com/now/stolen-credit-card-info-on-the-dark-web-tripled-in-6-months-171720889.html>
- The Tor Project
 - <https://2019.www.torproject.org/index.html.en>
- Cybercrime-as-a-Service Economy: Stronger Than Ever, BankInfoSecurity
 - <https://www.bankinfosecurity.com/cybercrime-as-a-service-economy-stronger-than-ever-a-9396>





Questions



Upcoming Briefs

- Securing 5G (20AUG20)

Requests for Information

Need information on a specific cybersecurity topic? Send your request for information (RFI) to HC3@HHS.GOV or call us Monday-Friday, between 9am-5pm (EST), at **(202) 691-2110**.

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HC3 Customer
Feedback

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Document that provides in-depth information on a cybersecurity topic to increase comprehensive situational awareness and provide risk recommendations to a wide audience.



Threat Briefings & Webinar

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