LEADERSHIP FOR IT SECURITY & PRIVACY ACROSS HHS

HHS CYBERSECURITY PROGRAM

OFFICE OF INFORMATION SECURITY

The Dark Web and Cybercrime

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Agenda

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  - 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?
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Slides Key:

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

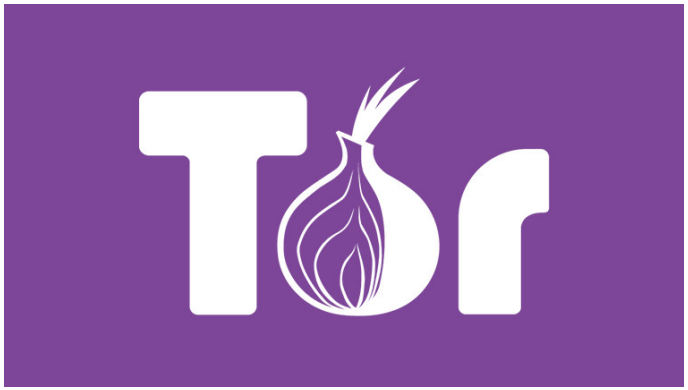
Technical: Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)

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 **T**he **O**nion **R**outer 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 vs Markets

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

Dark Web Cybercrime Culture

- 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 retraded, 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

Section Takeaway

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

Incident Overview

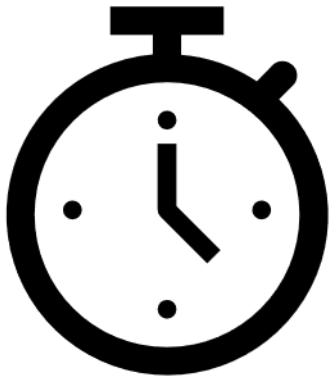
What Happened:

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**



Site Overview

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

Actor Overview

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

Actor Overview (continued)

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"

Actor Overview (continued)

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 aliments 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

Incident Takeaways #1

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

Incident Takeaways #2

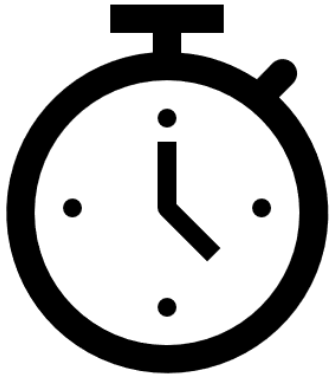
Understanding the site, actors, and context matters

- 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

Incident Takeaways #3

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

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  - https://www.yahoo.com/now/stolen-credit-card-info-on-the-dark-web-tripled-in-6-months-171720889.html
- The Tor Project
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Questions

Questions

Upcoming Briefs

- Securing 5G (20AUG20)

Requests for Information

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