Final Engagement

Attack, Defense & Analysis of a Vulnerable Network

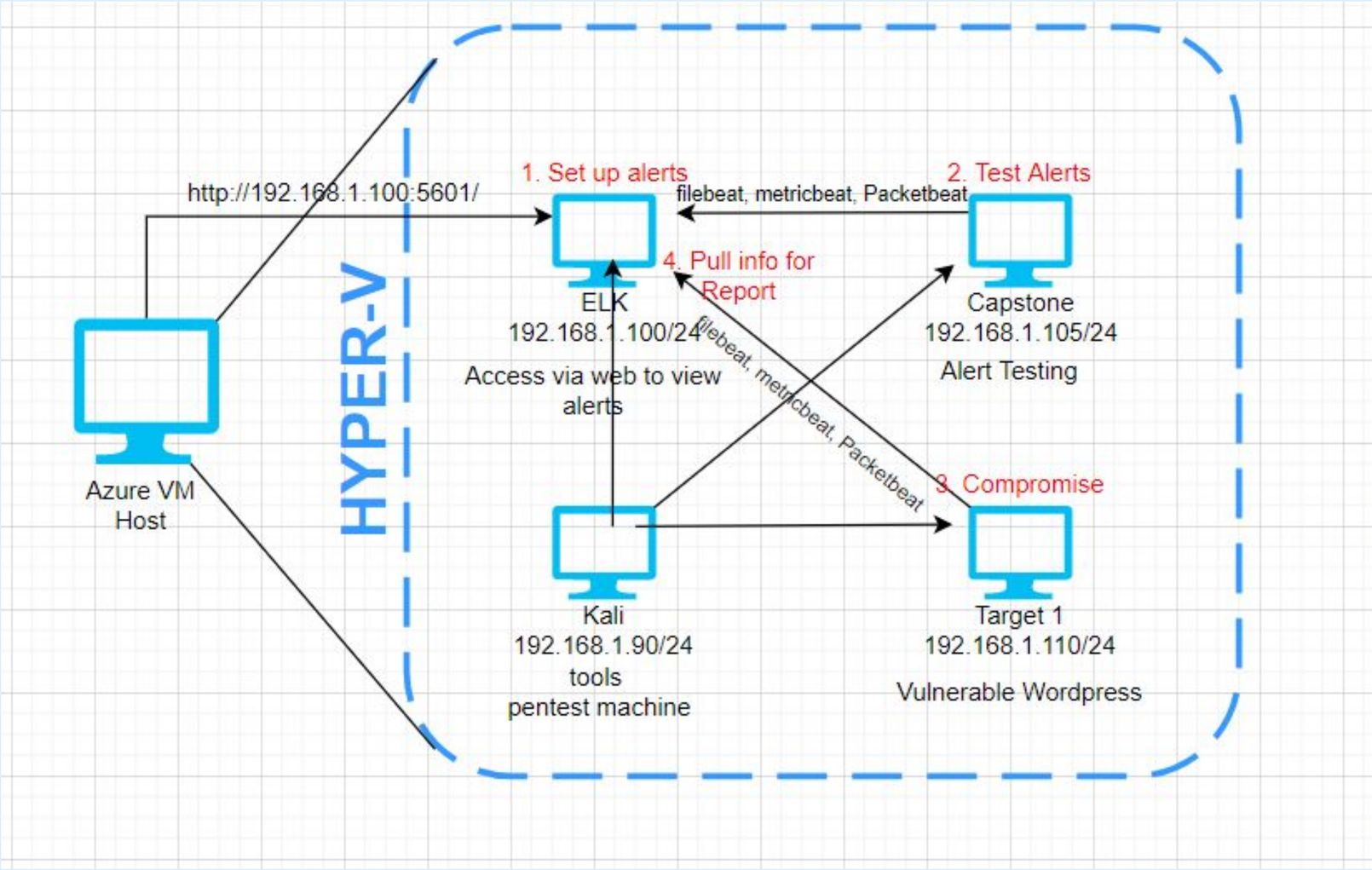
Table of Contents

This document contains the following resources:

- **Network Topology & Critical Vulnerabilities**
- **Traffic Profile**
- **Normal Activity**
- **Malicious Activity**

Network Topology
& Critical Vulnerabilities

Network Topology



Network
Address Range:192.168.1.0/24
Netmask:255.255.255.0
Gateway:

Machines
IPv4: 192.168.1.100/24
OS: Ubuntu 18.04.4
Hostname: ELK

IPv4:192.168.1.105/24
OS: Ubuntu 18.04.1
Hostname:Capstone

IPv4:192.168.1.90/24
OS: Kali GNU/Linux 2020.1
Hostname:Kali

IPv4:192.168.1.110/24
OS: Debian GNU/Linux 8
Hostname: Target 1

Exposed Services: Target 1

Nmap Scan :

```
root@Kali:~# nmap -Pn -sV 192.168.1.110
Starting Nmap 7.80 ( https://nmap.org ) at 2021-06-05 10:42 PDT
Nmap scan report for 192.168.1.110
Host is up (0.0013s latency).
Not shown: 995 closed ports
PORT    STATE SERVICE     VERSION
22/tcp  open  ssh         OpenSSH 6.7p1 Debian 5+deb8u4 (protocol 2.0)
80/tcp  open  http        Apache httpd 2.4.10 ((Debian))
111/tcp open  rpcbind     2-4 (RPC #100000)
139/tcp open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
MAC Address: 00:15:5D:00:04:10 (Microsoft)
Service Info: Host: TARGET1; OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 11.74 seconds
root@Kali:~#
```

Exposed Services: Target 1

Our assessment uncovered the following critical Exposed Services in **Target 1**.

Vulnerability	Description	Impact
Port 22 : Open	Provides access to SSH into target machine.	If credentials are discovered or cracked could allow for external access.
Port 80 : Open	Provides access to unencrypted packets.	Can provide direct access to the http server / web browser.

Critical Vulnerabilities: Target 1

Our assessment uncovered the following critical vulnerabilities in **Target 1**.

Vulnerability	Description	Impact
Weak Password Policy	We were able to guess user michael's password on our first attempt. It was his username.	This provided access to SSH directly into the system with no resistance.
CVE-2017-3167	Apache versions before 2.4.26 allows for the use of use of : **ap_get_basic_auth_pw()** to bypass authentication requirements.	Potentially allows for escalation for an attacker if access established.
CVE-2014-3583	Apache version 2.4.10 is vulnerable to DOS attacks via buffer-over-read from long response headers.	This provides an easy target for DOS attacks and may affect availability of a system if exploited.

Critical Vulnerabilities: Target 1

Continuation of critical vulnerabilities in **Target 1**.

Vulnerability	Description	Impact
CVE-2016-0777	In OpenSSH Version prior to 7.1p2, entire buffers from system memory can be requested remotely, allowing sensitive information to become compromised.	This may impact Confidentiality of data if used as an attack vector.
CVE-2016-6210	In OpenSSH prior to 7.3, users can enumerate user credentials by leveraging timing differences in response times when a large password is employed. A different form of hashing (Blowfish instead of SHA256 or SHA512) is used when a User does not exist.	The enumeration of users combined with a potentially weak password policy could allow easy access to malicious actors.
CVE-2015-8325	In OpenSSH through 7.2p2, under certain conditions, users can easily gain privileges by triggering a crafted environment for the /bin/login program.	This would potentially be an avenue for a malicious actor, who has gained access, to escalate the privileges of a user that has been compromised.

Critical Vulnerabilities: Target 1

WP Scan :

```
[+] URL: http://192.168.1.110/wordpress/
[+] Started: Sat Jun  5 10:11:20 2021

Interesting Finding(s):

[+] http://192.168.1.110/wordpress/
  | Interesting Entry: Server: Apache/2.4.10 (Debian)
  | Found By: Headers (Passive Detection)
  | Confidence: 100%

[+] http://192.168.1.110/wordpress/xmlrpc.php
  | Found By: Direct Access (Aggressive Detection)
  | Confidence: 100%
  | References:
  |  - http://codex.wordpress.org/XML-RPC_Pingback_API
  |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_ghost_scanner
  |  - https://www.rapid7.com/db/modules/auxiliary/dos/http/wordpress_xmlrpc_dos
  |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_xmlrpc_login
  |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_pingback_access

[+] http://192.168.1.110/wordpress/readme.html
  | Found By: Direct Access (Aggressive Detection)
  | Confidence: 100%

[+] http://192.168.1.110/wordpress/wp-cron.php
  | Found By: Direct Access (Aggressive Detection)
  | Confidence: 60%
  | References:
  |  - https://www.iplocation.net/defend-wordpress-from-ddos
  |  - https://github.com/wpscanteam/wpscan/issues/1299

[+] WordPress version 4.8.17 identified (Latest, released on 2021-05-13).
  | Found By: Emoji Settings (Passive Detection)
  |  - http://192.168.1.110/wordpress/, Match: '-release.min.js?ver=4.8.17'
  | Confirmed By: Meta Generator (Passive Detection)
  |  - http://192.168.1.110/wordpress/, Match: 'WordPress 4.8.17'
```

Critical Vulnerabilities: Target 1

Our assessment uncovered the following critical vulnerabilities in **Target 1**.

Vulnerability	Description	Impact
WordPress XMLRPC GHOST Vulnerability Scanner CVE-2015-0235	Determines hosts vulnerable to the GHOST vulnerability via a call to the WordPress XMLRPC Interface	If target is vulnerable, the system will segfault and return a server error
Wordpress XMLRPC DoS CVE-2014-5266	Wordpress XMLRPC parsing in vulnerable to a XML based denial of service	This vulnerability affects Wordpress 3.5-3.9.2 (3.8.4 and 3.7.4 are also patched)
Wordpress XML-RPC Username/Password Login Scanner CVE-1999-0502	attempts to authenticate against a Wordpress-site (via XMLRPC) using username and password combinations indicated by the USER_FILE, PASS_FILE, and USERPASS_FILE options.	Can provide Login access
Wordpress Pingback Locator CVE-2013-0235	This module will scan for wordpress sites with the Pingback API enabled.	By interfacing with the API an attacker can cause the wordpress site to port scan an external target and return results

Traffic Profile

Traffic Profile

Our analysis identified the following characteristics of the traffic on the network:

Feature	Value	Description
Top Talkers (IP Addresses)	172.16.4.205 (45M Bytes) 166.62.111.64 (16M Bytes) 185.243.115.84 (26M Bytes)	Machines that sent the most traffic.
Most Common Protocols	UDP TCP TLSv1.2	Three most common protocols on the network.
# of Unique IP Addresses	808	Count of observed IP addresses.
Subnets	24-bit Block	Observed subnet ranges.
# of Malware Species	1 Trojan (June11.dll)	Number of malware binaries identified in traffic.

Behavioral Analysis

Purpose of Traffic on the Network

Users were observed engaging in the following kinds of activity.

“Normal” Activity

- Visiting web URLs
- Viewing pictures
- Social media

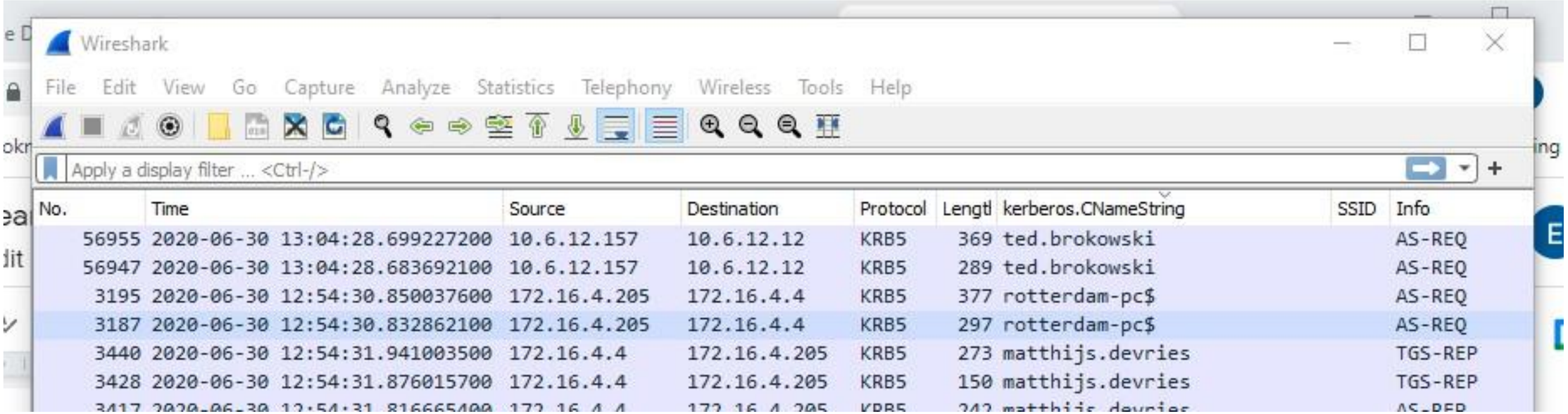
Suspicious Activity

- “Time Thieves” are wasting company time by watching YouTube Videos.
- Creation of a personal web server on the corporate Network: Frank-n-Ted.com
- Malware Downloaded onto Machine (10.6.12.203). The Malware downloaded, June11.d11, was determined to be a Trojan Horse.
- Downloaded Torrent File: Betty_Boop_Rhythm_on_the_Reservation.avi.torrent. (The company has a strict policy on copyright infringement.)

Normal Activity

Normal Behaviors

Identified users who are participating in non-malicious traffic



No.	Time	Source	Destination	Protocol	Length	kerberos.CNameString	SSID	Info
56955	2020-06-30 13:04:28.699227200	10.6.12.157	10.6.12.12	KRB5	369	ted.brokowski		AS-REQ
56947	2020-06-30 13:04:28.683692100	10.6.12.157	10.6.12.12	KRB5	289	ted.brokowski		AS-REQ
3195	2020-06-30 12:54:30.850037600	172.16.4.205	172.16.4.4	KRB5	377	rotterdam-pc$		AS-REQ
3187	2020-06-30 12:54:30.832862100	172.16.4.205	172.16.4.4	KRB5	297	rotterdam-pc$		AS-REQ
3440	2020-06-30 12:54:31.941003500	172.16.4.4	172.16.4.205	KRB5	273	matthijs.devries		TGS-REP
3428	2020-06-30 12:54:31.876015700	172.16.4.4	172.16.4.205	KRB5	150	matthijs.devries		TGS-REP

User	Ip Addr of Device	Protocol	Website	Description
ted.brokowski	10.6.12.157	HTTP	cardboardspaceshiptoys.com	Viewing an invoice
matthijs.devries	172.16.4.205	HTTP	mysocalledchaos.com	Surfing the web
		HTTP	green.mattingsolutions.co	Downloading wallpaper image
candice.tucker	10.11.11.203	HTTP	https://acjabogados.com/	Surfing the web
brandon.gilbert	10.11.11.200	HTTP	www.vinylmeplease.com	Surfing the web
frank.brokowski	10.6.12.203			abnormal - Getting june11
elmer.blanco	10.0.0.201			abnormal - watching movies , animations, torrents

Viewing an invoice by ted.brokowski

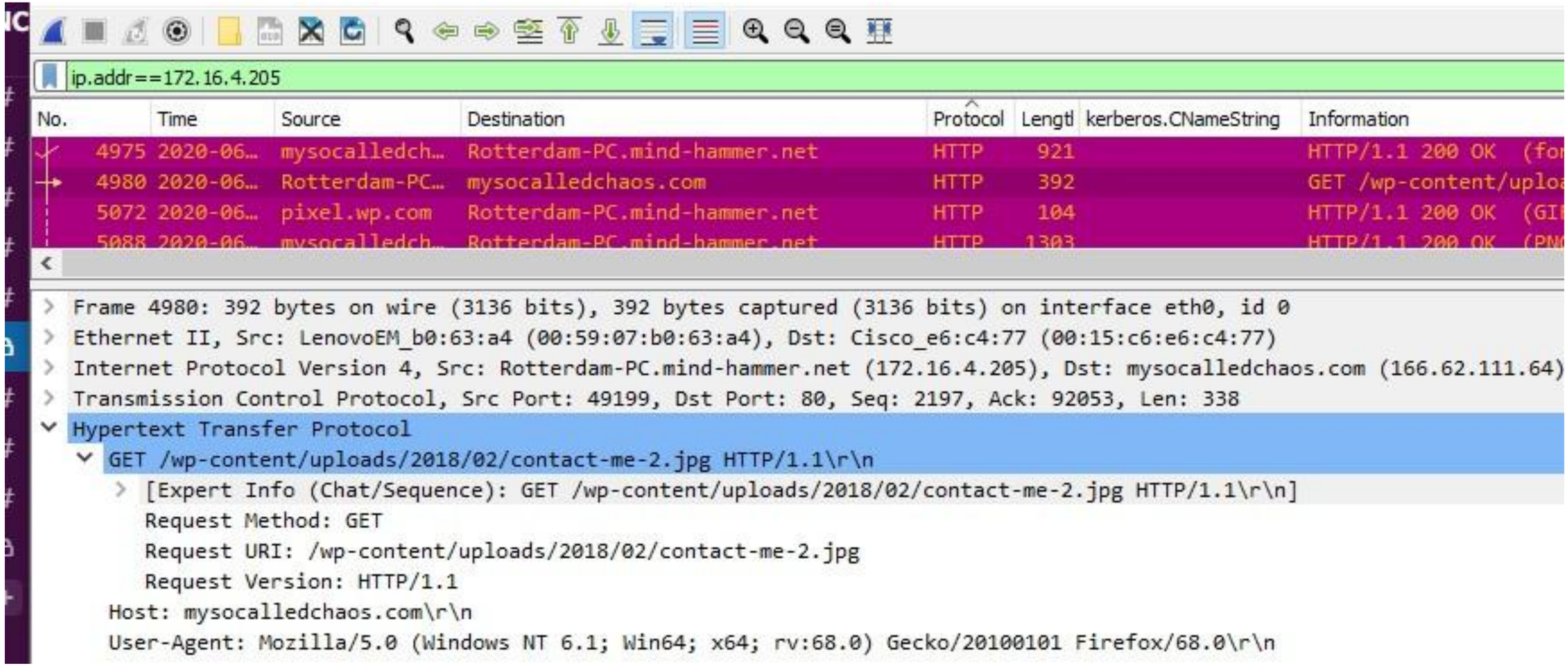
ip.addr==10.6.12.157

	Time	Source	Destination	Protocol	Length	kerberos.CNameString	Information
57173	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	54		Membership Report / Join group 239.
55428	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	62		Membership Report / Join group 224.
55424	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	54		Membership Report / Join group 224.
55423	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	54		Membership Report / Leave group 224
55422	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	54		Membership Report / Join group 224.
55421	2020-06…	10.6.12.157	224.0.0.22	IGMPv3	54		Membership Report / Join group 224.
57913	2020-06…	172.93.120.242	10.6.12.157	HTTP	561		HTTP/1.1 302 Found (text/html)
57901	2020-06…	10.6.12.157	172.93.120.242	HTTP	513		GET /logs/invoice-86495.doc HTTP/1.
58540	2020-06…	10.6.12.12	10.6.12.157	EPM	226		Map response, DRSUAPI, 32bit NDR
58539	2020-06…	10.6.12.157	10.6.12.12	EPM	222		Map request, DRSUAPI, 32bit NDR
58523	202						
58522	202						
58306	202						
58305	202						
58289	202						
58288	202						
57004	202						
57003	202						
56013	202						

Wireshark · Packet 57901 · part_3.pcapng

```
> Internet Protocol Version 4, Src: 10.6.12.157, Dst: 172.93.120.242
> Transmission Control Protocol, Src Port: 49728, Dst Port: 80, Seq: 1, Ack: 1, Len: 459
v Hypertext Transfer Protocol
  > GET /logs/invoice-86495.doc HTTP/1.1\r\n
    Host: cardboardspaceshiptoys.com\r\n
    Connection: keep-alive\r\n
```

Surfing the web by matthijs.devries



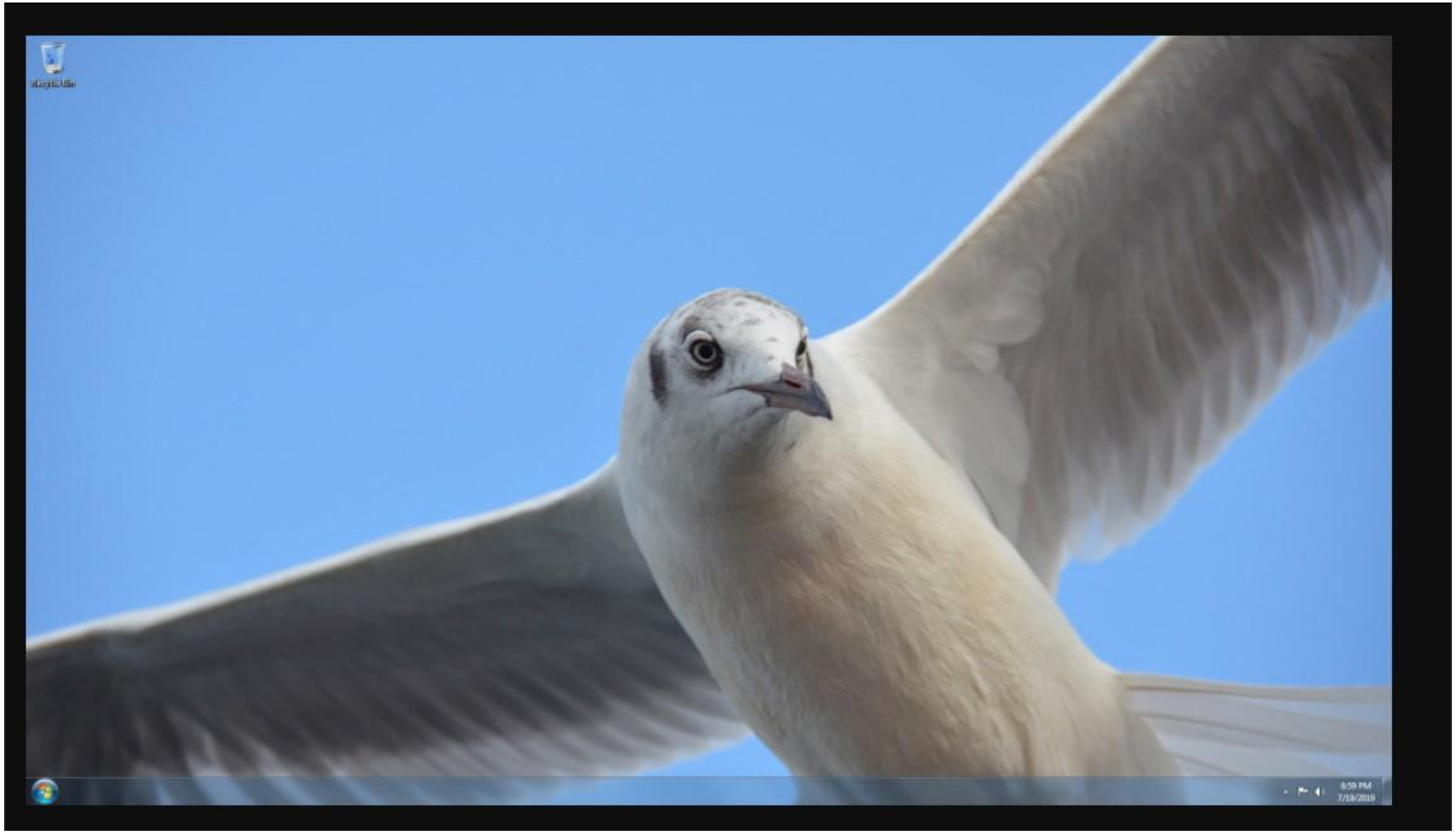
Downloading wallpaper image by matthijs.devries

ip.addr==172.16.4.205

No.	Time	Source	Destination	Protocol	Length	kerberos.CNameString	Information
26139	2020-06…	172.16.4.205	31.7.62.214	HTTP	282		POST http://31.
27702	2020-06…	172.16.4.205	185.243.115.84	HTTP	496		POST /empty.gif
27704	2020-06…	185.243.115.84	172.16.4.205	HTTP	341		HTTP/1.1 200 OK
28546	2020-06…	172.16.4.205	31.7.62.214	HTTP	282		POST http://31.
31329	2020-06…	172.16.4.205	31.7.62.214	HTTP	282		POST http://31.
31721	2020-06…	172.16.4.205	185.243.115.84	HTTP	1366		POST /empty.gif

```
> Request URI: /empty.gif?ss&ss1img
  Request Version: HTTP/1.1
Accept: */*\r\n
Accept-Language: en-US\r\n
Age: 911068f789126eb9\r\n
UA-CPU: AMD64\r\n
Accept-Encoding: gzip, deflate\r\n
User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.1; Win64; x64; Trident/7.0; .NET CLR 2.0.50727; SLCC2; .NET CLR 3.5
Host: b5689023.green.mattingsolutions.co\r\n
> Content-Length: 3592206\r\n
Connection: Keep-Alive\r\n
Cache-Control: no-cache\r\n
\r\n
[Full request URI: http://b5689023.green.mattingsolutions.co/empty.gif?ss&ss1img]
[HTTP request 4/5]
```

Downloading wallpaper image by matthijs.devries



Surfing the web by candice.tucker

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

ip.addr==10.11.11.203

No.	Time	Source	Destination	Protocol	Length	kerberos.CNameString	Information
35903	2020-06…	okay-boomer-…	Tucker-Win7-PC.okay-boomer.info	EPM	226		Map response, DRSUAPI, 32bit NDR
45039	2020-06…	Tucker-Win7-…	okay-boomer-dc.okay-boomer.info	EPM	222		Map request, LSARPC, 32bit NDR
45040	2020-06…	okay-boomer-…	Tucker-Win7-PC.okay-boomer.info	EPM	226		Map response, LSARPC, 32bit NDR
43967	2020-06…	Tucker-Win7-…	acjabogados.com	HTTP	368		GET /40group.tiff HTTP/1.1
44537	2020-06…	acjabogados.…	Tucker-Win7-PC.okay-boomer.info	HTTP	1072		HTTP/1.1 200 OK (image/tiff)
34329	2020-06…	Tucker-Win7-…	igmp.mcast.net	IGMPv3	60		Membership Report / Join group 224.0.0.252 f
34331	2020-06…	Tucker-Win7-…	igmp.mcast.net	IGMPv3	60		Membership Report / Join group 224.0.0.252 f

```
> Internet Protocol Version 4, Src: Tucker-Win7-PC.okay-boomer.info (10.11.11.203), Dst: acjabogados.com (188.95.248.71)
> Transmission Control Protocol, Src Port: 49196, Dst Port: 80, Seq: 1, Ack: 1, Len: 314
v Hypertext Transfer Protocol
  v GET /40group.tiff HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET /40group.tiff HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /40group.tiff
      Request Version: HTTP/1.1
    Accept: */*\r\n
    Accept-Encoding: gzip, deflate\r\n
    User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.1; WOW64; Trident/7.0; SLCC2; .NET CLR 2.0.50727; .NET CLR 3.5.30729; .NET CLR 3.0.
    Host: acjabogados.com\r\n
    Connection: Keep-Alive\r\n
    \r\n
    [Full request URI: http://acjabogados.com/40group.tiff]
```

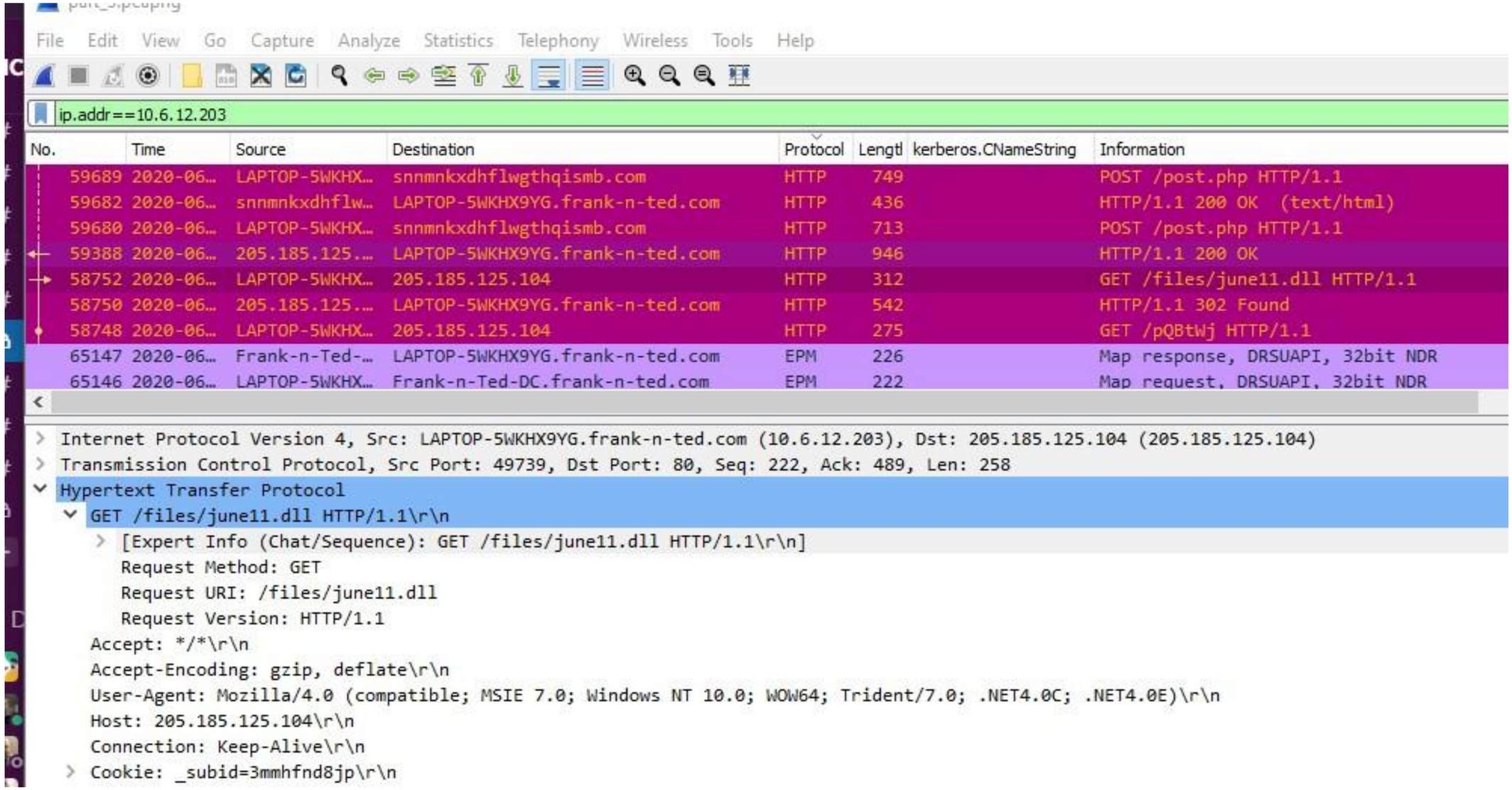
Surfing the web by brandon.gilbert

ip.addr==10.11.11.200

No.	Time	Source	Destination	Protocol	Length	kerberos.CNameString	Information
50145	2020-06…	Gilbert-Win7-PC.okay-boomer.info	dr7o7g8tgewgc.cloudfront.net	HTTP	486		GET /widgets/con
49925	2020-06…	djnf6e5yyirys.cloudfront.net	Gilbert-Win7-PC.okay-boomer.info	HTTP	863		HTTP/1.1 200 OK
49859	2020-06…	Gilbert-Win7-PC.okay-boomer.info	djnf6e5yyirys.cloudfront.net	HTTP	430		GET /js/friendbu
46112	2020-06…	www.vinylmeplease.com	Gilbert-Win7-PC.okay-boomer.info	HTTP	59		HTTP/1.1 200 OK
46107	2020-06…	Gilbert-Win7-PC.okay-boomer.info	www.vinylmeplease.com	HTTP	572		GET /static/ofi.
46096	2020-06…	www.vinylmeplease.com	Gilbert-Win7-PC.okay-boomer.info	HTTP	276		HTTP/1.1 200 OK
46081	2020-06…	Gilbert-Win7-PC.okay-boomer.info	www.vinylmeplease.com	HTTP	547		GET /static/styl
46078	2020-06…	www.vinylmeplease.com	Gilbert-Win7-PC.okay-boomer.info	HTTP	868		HTTP/1.1 200 OK
46007	2020-06…	Gilbert-Win7-PC.okay-boomer.info	www.vinylmeplease.com	HTTP	502		GET /magazine/gu

```
> Frame 46107: 572 bytes on wire (4576 bits), 572 bytes captured (4576 bits) on interface eth0, id 0
> Ethernet II, Src: Dell_8a:50:a9 (84:8f:69:8a:50:a9), Dst: Cisco_97:4b:f0 (00:01:c9:97:4b:f0)
> Internet Protocol Version 4, Src: Gilbert-Win7-PC.okay-boomer.info (10.11.11.200), Dst: www.vinylmeplease.com (13.33.255.37)
> Transmission Control Protocol, Src Port: 49198, Dst Port: 80, Seq: 942, Ack: 51692, Len: 518
v Hypertext Transfer Protocol
  > GET /static/ofi.browser.293d64b6588f.js HTTP/1.1\r\n
    Accept: application/javascript, */*;q=0.8\r\n
    Referer: http://www.vinylmeplease.com/magazine/guide-to-flattening-warped-vinyl-records/\r\n
    Accept-Language: en-US\r\n
    User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; Trident/7.0; rv:11.0) like Gecko\r\n
    Accept-Encoding: gzip, deflate\r\n
    Host: www.vinylmeplease.com\r\n
    DNT: 1\r\n
    Connection: Keep-Alive\r\n
  > Cookie: _gcl_au=1.1.949876142.1573510598; _ga=GA1.2.2082810095.1573510598; _gid=GA1.2.1906447370.1573510598; __zlcmid=vDigFj7IpbARDG
    \r\n
    [Full request URI: http://www.vinylmeplease.com/static/ofi.browser.293d64b6588f.js]
    [HTTP request 3/3]
```

Surfing the web by frank.brokowski

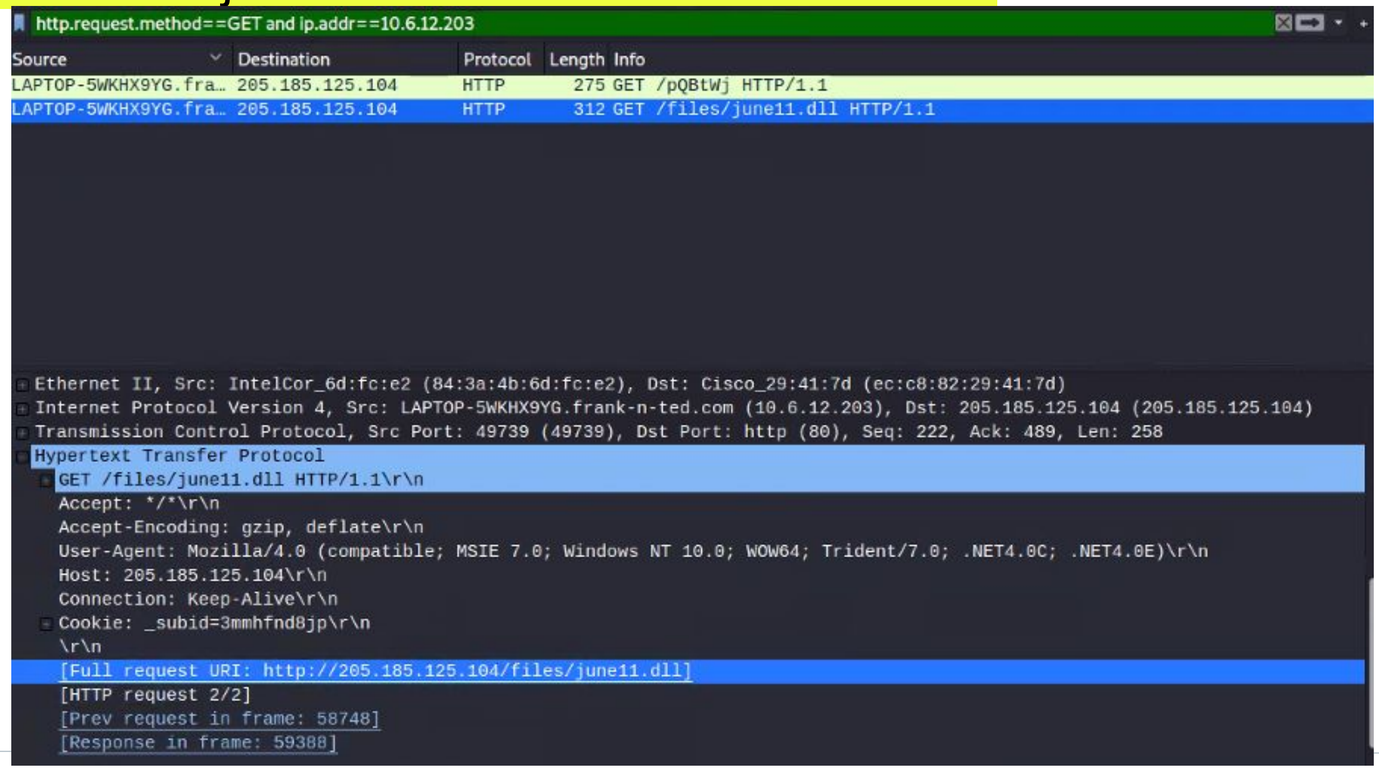


Malicious Activity

Trojan Horse

Summarize the following:

- What kind of traffic did you observe? Which protocol(s)? Traffic from 10.6.12.203 and the web domain 205.185.125.104; Hypertext transfer Protocol
- What, specifically, was the user doing? Which site were they browsing? Etc. The user requested to download june11.dll from IP 205.185.125.104



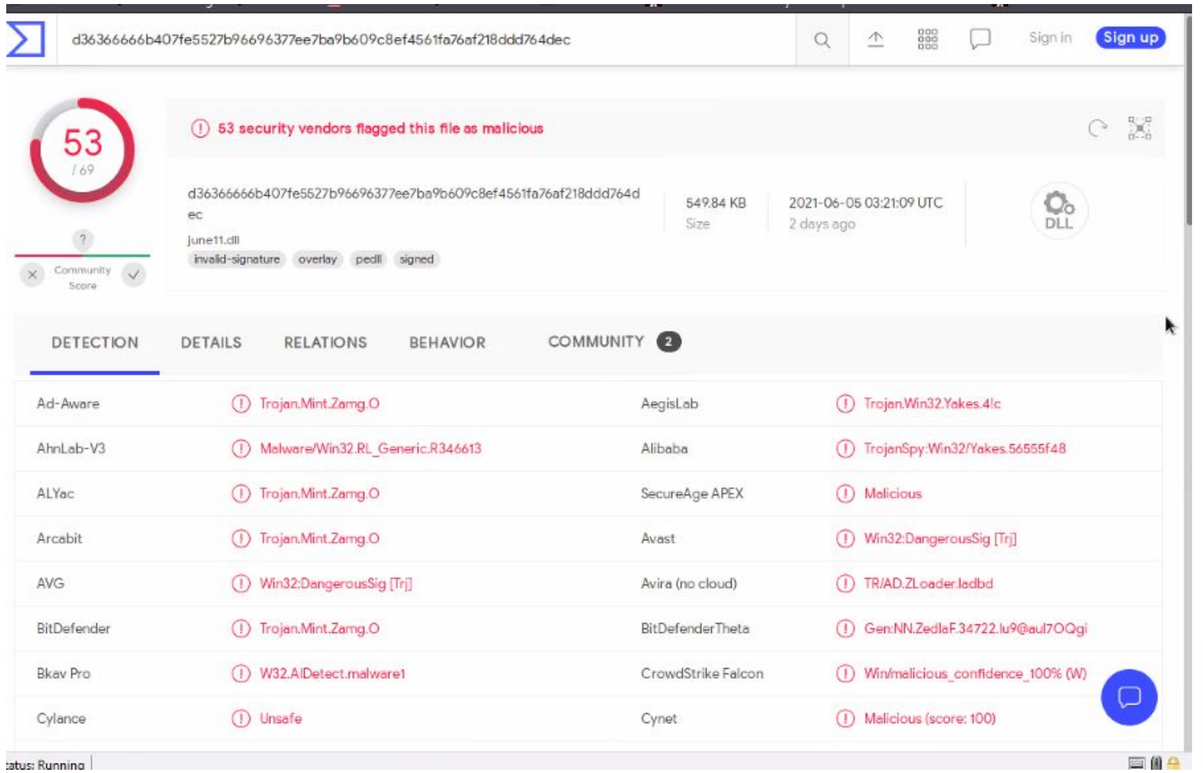
Continued

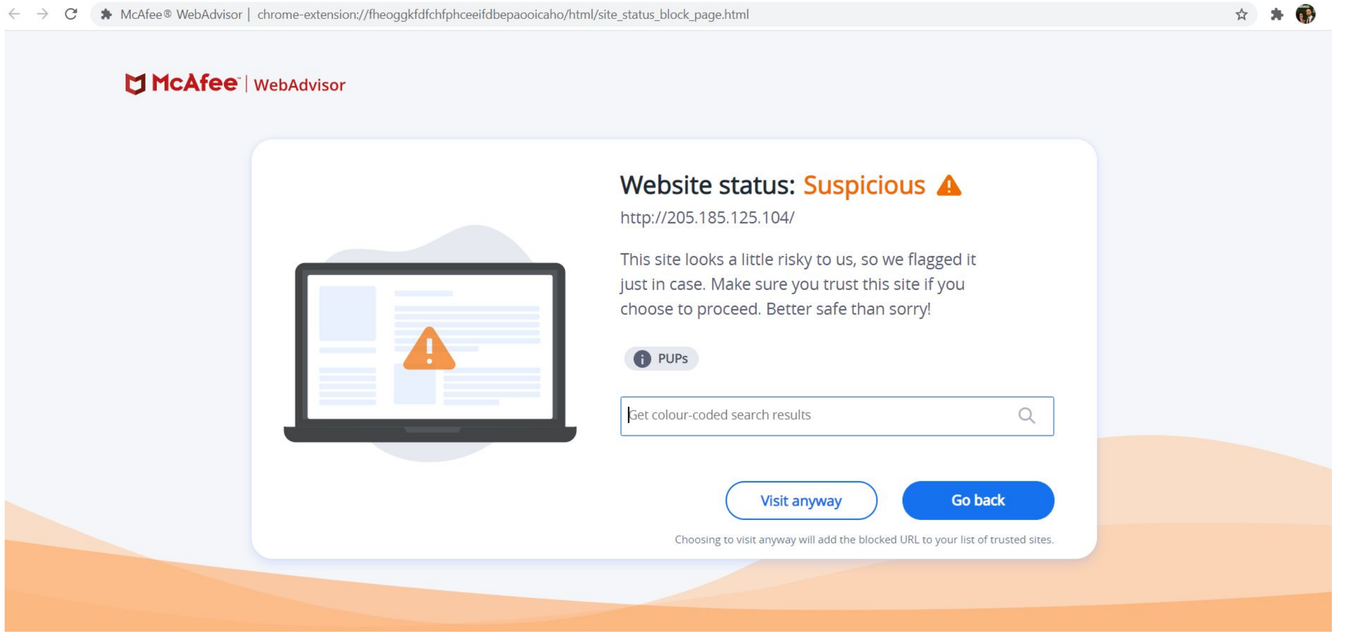
Virustotal.com & Whatismyip.com

ASN: 53667

ISP: Frantech Solutions

Host Name: 205.185.125.104





Continued

Two users have created their own web server on the corporate network.

Risks associated with loose user restrictions:

1. Unrestricted User Access Can Lead to Accidental Data Exposure
2. User Access Can Lead to Intentional Privilege Misuse & Abuse
    a. i.e. two employees were watching youtube
3. Hackers Can Use Compromised User Credentials
    a. i.e. A malicious files was downloaded infecting anyone that downloaded it.

Giving employees and contractors unrestricted user permissions and user access could spell disaster for many businesses because doing so creates unnecessary cybersecurity risks.

<u>Best Prevention Practices:</u>

- Check the existing roles to see if they meet your needs
- Make a duplicate of an existing role, then add or remove permissions as needed
- Test your customized role to ensure it behaves as expected
- Assign your custom role to users

[Torrent Download]

- What kind of traffic did you observe? Which protocol(s)? Traffic between ip 10.0.0.201 and web domains; Hyper Text Transfer Protocol - HTTP
- What, specifically, was the user doing? Which site were they browsing? Etc. The user (elmer.blanco) was downloading the torrent from a website: http://publicdomaintorrents.com
- Include screenshots of packets justifying your conclusions.
- Include a description of any interesting files. “Betty_Boop_Rhythm_on_the_Reservation” which is a torrent downloaded, which is prohibited from the company’s policy.

```
TCP payload (535 bytes)
⊟ Hypertext Transfer Protocol
  ⊟ GET /bt/btdownload.php?type=torrent&file=Betty_Boop_Rhythm_on_the_Reservation.avi.torrent HTT
    ⊟ [Expert Info (Chat/Sequence): GET /bt/btdownload.php?type=torrent&file=Betty_Boop_Rhythm_on
        [GET /bt/btdownload.php?type=torrent&file=Betty_Boop_Rhythm_on_the_Reservation.avi.torren
        [Severity level: Chat]
        [Group: Sequence]
```

Torrent Download Continued..

X-CORP's Security team does not forbid the use of torrents for legitimate purposes. However, this one may go against their policy on copyright infringement.

Risks associated with Torrent Download:

- A good portion of the files available through P2P networks contain copyrighted materials, making this illegal.
- Downloading Torrents are far less safe than most think.
  - Most torrents are a big target for Hackers to use to compromise a system or network.
  - They can easily disguise Malware with a more desirable name to trick someone into infecting their system with this.

- It is best practice to only download authorized Torrents, pertinent to getting the job done from a known trusted source, and still scanning for Malware before downloading.

The End