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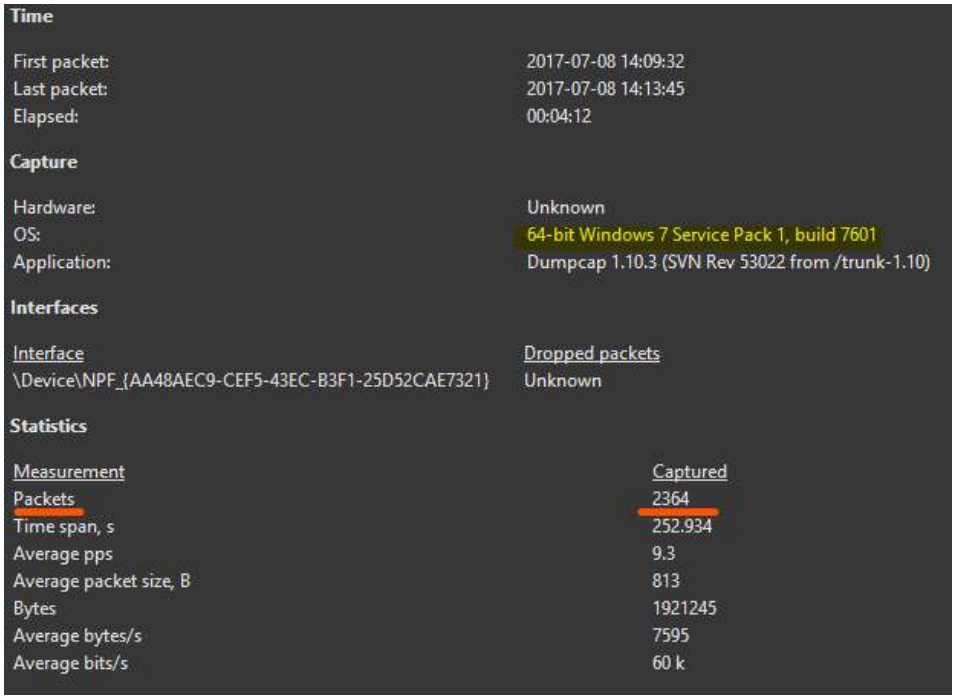
IS3523

Lab 4: Attack Analysis

In this lab, I was provided with a packet capture and two copies of captured event logs and asked to identify what attacks, if any, had occurred.

I was provided a packet capture from July 8th 2017 taken between the minutes of 2:09 pm to 2:13 pm, from a Windows device. In total, 2364 packets were captured.



Time

First packet:	2017-07-08 14:09:32
Last packet:	2017-07-08 14:13:45
Elapsed:	00:04:12

Capture

Hardware:	Unknown
OS:	64-bit Windows 7 Service Pack 1, build 7601
Application:	Dumpcap 1.10.3 (SVN Rev 53022 from /trunk-1.10)

Interfaces

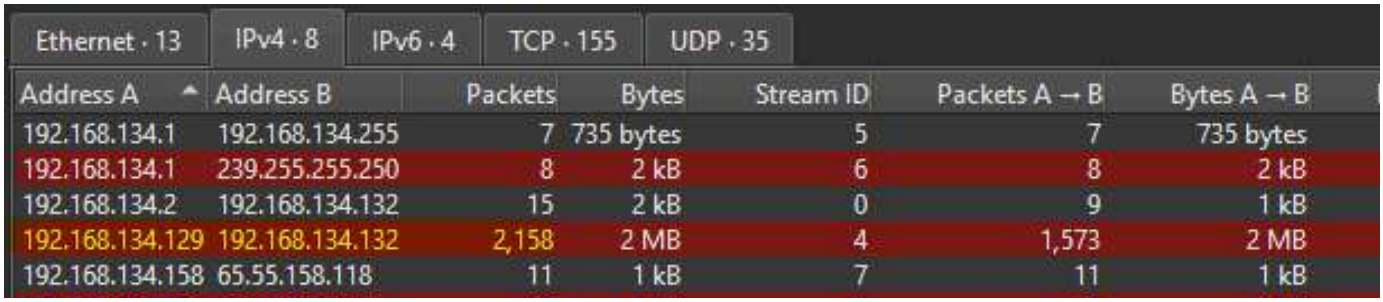
Interface	Dropped packets
\Device\NPF_{AA48AEC9-CEF5-43EC-B3F1-25D52CAE7321}	Unknown

Statistics

Measurement	Captured
Packets	2364
Time span, s	252.934
Average pps	9.3
Average packet size, B	813
Bytes	1921245
Average bytes/s	7595
Average bits/s	60 k

Total packets captured.

Of the 2364, approximately 91% of the packets originate from conversations between the devices with the IP addresses of 192.168.134.129 and 192.168.134.132. The concentration of traffic between the two local devices is unusually dense in comparison to the surrounding traffic. Therefore revealing the need for further investigation of the conversations between the .132 and .129 devices.



Ethernet · 13 | IPv4 · 8 | IPv6 · 4 | TCP · 155 | UDP · 35

Address A	Address B	Packets	Bytes	Stream ID	Packets A → B	Bytes A → B
192.168.134.1	192.168.134.255	7	735 bytes	5	7	735 bytes
192.168.134.1	239.255.255.250	8	2 kB	6	8	2 kB
192.168.134.2	192.168.134.132	15	2 kB	0	9	1 kB
192.168.134.129	192.168.134.132	2,158	2 MB	4	1,573	2 MB
192.168.134.158	65.55.158.118	11	1 kB	7	11	1 kB

Dense traffic between the .129 and .132 devices.

The majority of the traffic between the two devices originates from the .129 device, meaning that 192.168.132.129 was the source address for most of the traffic, initiating 66% of the packets in the packet capture. The unusually high amount of traffic generated by the .129 address is abnormal and suggests that the device may be compromised and targeting the .132 device.

Wireshark · IPv4 Statistics / Source and Destination Addresses · Maybe Hacked Box--Capture.pcapng

Topic / Item	Count	Average	Min Val	Max Val	Rate (ms)	Percent	Burst Rate	Burst Start
Source IPv4 Addresses	2284				0.0090	100%	6.2800	8.051
fe80::ffff:ffff:fffe	11				0.0000	0.48%	0.0100	71.983
192.168.134.2	28				0.0001	1.23%	0.0200	7.988
192.168.134.158	66				0.0003	2.89%	0.0700	4.711
192.168.134.132	591				0.0023	25.88%	0.9000	8.051
192.168.134.129	1573				0.0062	68.87%	5.3800	8.051
192.168.134.1	15				0.0001	0.66%	0.0100	13.203
Destination IPv4 Addresses	2284				0.0090	100%	6.2800	8.051
ff02::2	11				0.0000	0.48%	0.0100	71.983
239.255.255.250	8				0.0000	0.35%	0.0100	23.850
224.0.0.252	16				0.0001	0.70%	0.0200	69.962
224.0.0.22	31				0.0001	1.36%	0.0600	4.711
192.168.134.255	7				0.0000	0.31%	0.0100	13.203
192.168.134.2	25				0.0001	1.09%	0.0200	7.985
192.168.134.158	19				0.0001	0.83%	0.0200	7.988
192.168.134.132	1582				0.0063	69.26%	5.3800	8.051
192.168.134.129	585				0.0023	25.61%	0.9000	8.051

IPv4 Statistics - Source and Destination Addresses

To better my understanding of the packet capture, I analyzed the pcap with Snort. To do so, I used the following command:

Snort -c C:\Users\Administrator\Desktop\Snort\etc\snort.conf -r C:\Users\Administrator\Downloads\ExtraHop.pcap -A console > C:\Users\Administrator\Desktop\DMSDMS

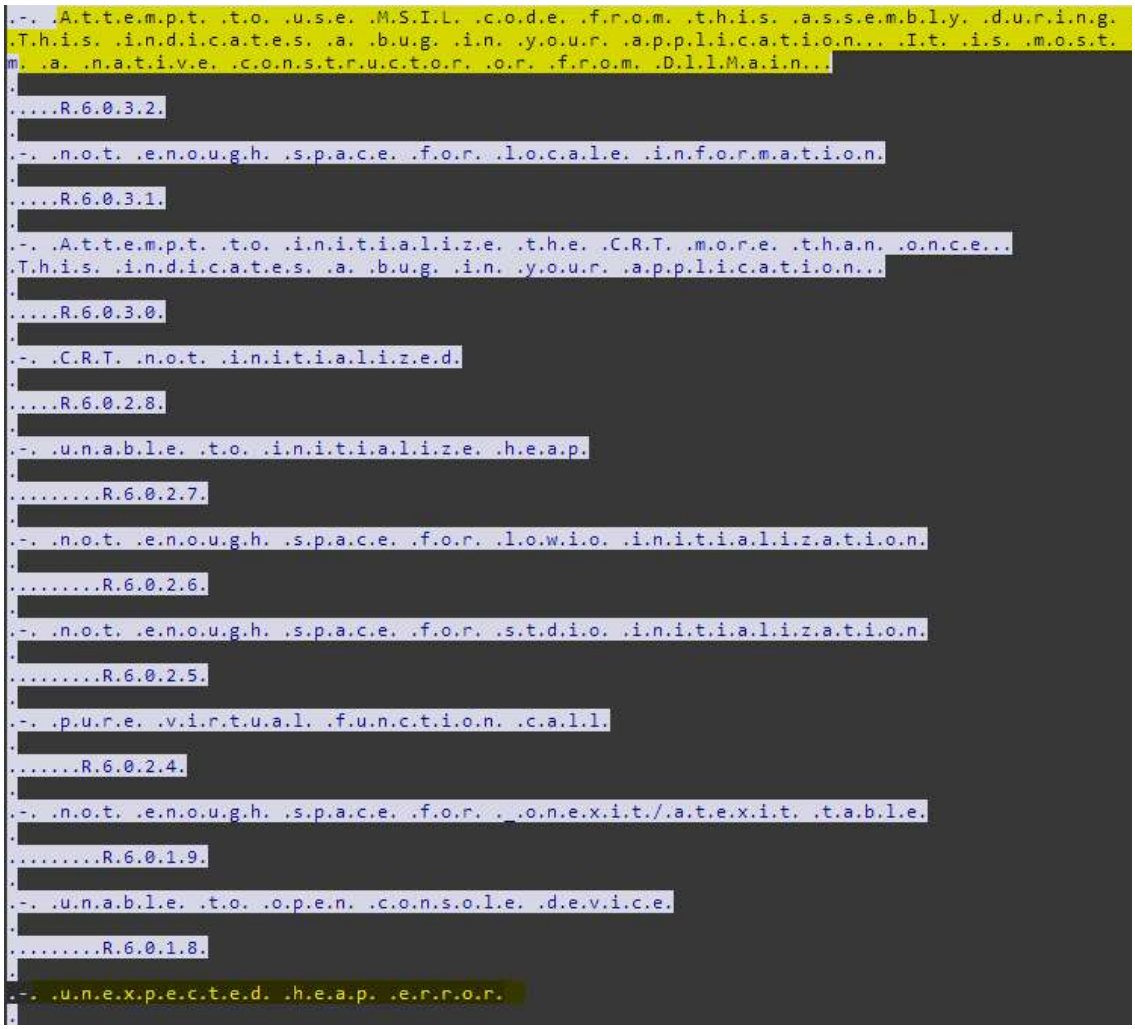
Snort generated 2 types of alerts: “Consecutive TCP small segments exceeding threshold” and “TCP Port Scan – Attempted Information Leak”. Breaking these alerts down, I discovered that the “TCP small segments exceeding threshold” alert is generated when Snort detects a sequence of TCP packets which surpass a predefined limit. This type of alert is associated with a tactic used by attackers involving sending a large amount of data to overwhelm a system or evade detection by breaking up malicious data into tiny pieces. Snort also revealed that the majority of the alerts were generated by the device with IP address of 192.168.132.129, targeting the device with an IP of 192.168.132.132.

```
07/08-14:09:45.771675  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:10:07.690853  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:10:20.198281  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:10:56.824496  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:13:22.663281  [**] [122:1:1] (portscan) TCP Portscan [**] [Classification: Attempted Information Leak] [Priority: 2] {PROTO:255} 192.168.134.129 -> 192.168.134.132
07/08-14:13:26.506722  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.132
07/08-14:13:26.508439  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:13:26.528204  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.132
07/08-14:13:26.530763  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:13:26.542385  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
07/08-14:13:26.547037  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.132
07/08-14:13:26.664836  [**] [129:12:2] Consecutive TCP small segments exceeding threshold [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TCP} 192.168.134.129
```

2 Alert types Src. 129, Dest. 132.

Next, I analyzed the TCP stream between the 129 and 132 devices to understand the meaning behind the traffic between the devices. When analyzing the stream, I found further proof for the “exceeded threshold” attack. In the stream, I discovered a runtime error log detailing a heap error caused by a bug in the application.

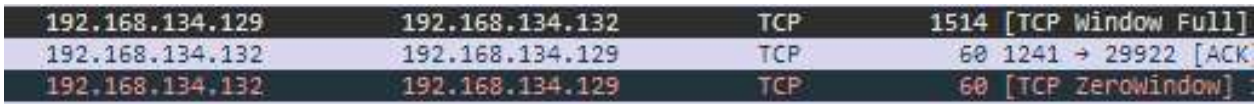
The TCP stream log reveals an example of system overwhelming due to multiple critical errors related to memory allocation and resource initialization failures. Errors such as “unable to initialize heap” and “CRT not initialized” indicate that the system is running out of memory. These issues are symptoms of a system struggling with excessive demands.



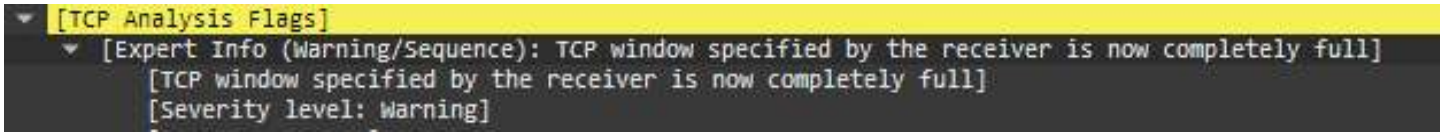
Heap error.

In the same TCP stream, I found further proof of system overwhelm through TCP limits being exceeded. Frames 642 and 644 reveal a "TCP Window Full" and "TCP ZeroWindow" warning. The 129 device is receiving a warning that the receiver's TCP window is now completely full. Additionally, the 132 device is sending a "ZeroWindow" warning to the 129 device, telling the sender to stop sending data because its buffer is completely full and cannot accept any more data. TCP ZeroWindow is a preventative measure against system overwhelm, such as that caused by buffer overflow attacks. Therefore, the immense

density of traffic from the 129 device, coupled with the Zero-Window buffer warnings, indicates an attack from the 129 device targeting the 132 device.



Window Full Packet Capture Warning.



TCP window is now completely full.

The second alert generated by Snort was for a port scan. I found additional evidence of the port scan through Wireshark, where I discovered that the user conducted the scan between frames 1898 and 2211. The attacker (192.168.134.129) sent SYN packets to 291 ports ranging from port 21 to port 65535.

TCP RST Traffic Resulting From Port Scan

To skip the RST Traffic table, jump to page 13.

Packet #	Src Port	Dest. Port	Source	Destination
1898	69	53678	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1900	80	42832	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1902	49	54297	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1904	81	44382	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1906	105	43410	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1908	42	42350	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1910	25	52129	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1912	23	37992	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1914	22	48859	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31
1916	21	37485	192.168.134.132 00:0c:29:7d:f3:78	192.168.134.129 00:0c:29:3f:20:31

1918	**143**	**40977**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1920	**161**	**50284**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1922	**389**	**50414**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1924	**407**	**42067**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1943	**111**	**40743**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1945	**110**	**47601**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1947	**548**	**33055**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1951	**623**	**41958**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1953	**689**	**35074**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1955	**515**	**43347**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1957	**514**	**34516**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1959	**513**	**45771**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1961	**512**	**55428**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1966	**443**	**33888**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1971	**1000**	**44464**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1973	**1099**	**41477**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1975	**1000**	**44464**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1977	**1433**	**43774**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

1979	**921**	**58793**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1981	**912**	**32959**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1983	**912**	**32849**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1985	**902**	**60928**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1987	**783**	**38602**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1989	**705**	**45548**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1991	**1723**	**52226**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1993	**1755**	**53556**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1995	**1900**	**45551**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1997	**2000**	**52405**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
1999	**1720**	**41726**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2001	**1582**	**49684**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2003	**1581**	**41829**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2005	**1533**	**48066**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2007	**1521**	**47122**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2009	**1434**	**40375**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2011	**2947**	**47345**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2013	**2967**	**50722**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

2015	**3000**	**37683**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2017	**3050**	**56979**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2019	**2525**	**43556**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2021	**2380**	**50891**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2023	**2207**	**35976**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2025	**2103**	**40926**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2027	**2100**	**46673**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2029	**2046**	**37341**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2031	**4000**	**41733**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2033	**4659**	**33636**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2035	**4848**	**58980**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2037	**5038**	**33074**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2039	**3690**	**44254**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2041	**3632**	**53783**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2043	**3628**	**44751**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2045	**3306**	**57665**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2047	**3128**	**45169**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2049	**3057**	**55634**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

2051	**5405**	**57990**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2053	**5432**	**59107**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2055	**5554**	**42645**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2057	**5555**	**46182**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2059	**5250**	**36033**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2061	**5168**	**51029**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2063	**5093**	**45326**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2065	**5061**	**52146**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2067	**5060**	**44594**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2069	**5051**	**41554**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2071	**6070**	**52850**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2073	**6080**	**42972**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2075	**6101**	**60868**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2079	**6050**	**60132**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2081	**5985**	**48966**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2083	**5900**	**47461**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2085	**5800**	**40695**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2087	**5631**	**39710**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

2089	**5560**	**50645**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2091	**7144**	**39440**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2093	**7510**	**47874**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2095	**7579**	**48136**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2097	**7580**	**41114**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2099	**6905**	**40500**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2101	**6667**	**41562**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2103	**6660**	**51607**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2105	**6504**	**37782**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2107	**6503**	**49148**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2109	**6502**	**37568**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2111	**8080**	**38117**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2113	**8090**	**54953**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2115	**8300**	**37442**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2117	**8800**	**36143**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2119	**8028**	**40247**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2121	**8014**	**59177**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2123	**8008**	**38663**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

2125	**8000**	**59050**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2127	**7787**	**45429**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2129	**7777**	**44226**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2131	**10001**	**47916**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2133	**10050**	**52437**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2135	**10202**	**47520**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2137	**10203**	**52156**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2139	**10000**	**51029**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2141	**9999**	**53193**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2143	**9495**	**59046**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2145	**9090**	**58805**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2147	**9080**	**40665**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2149	**8812**	**35607**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2151	**12401**	**49156**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2153	**13500**	**53418**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2155	**16102**	**39335**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2157	**17185**	**50515**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2159	**12203**	**40308**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

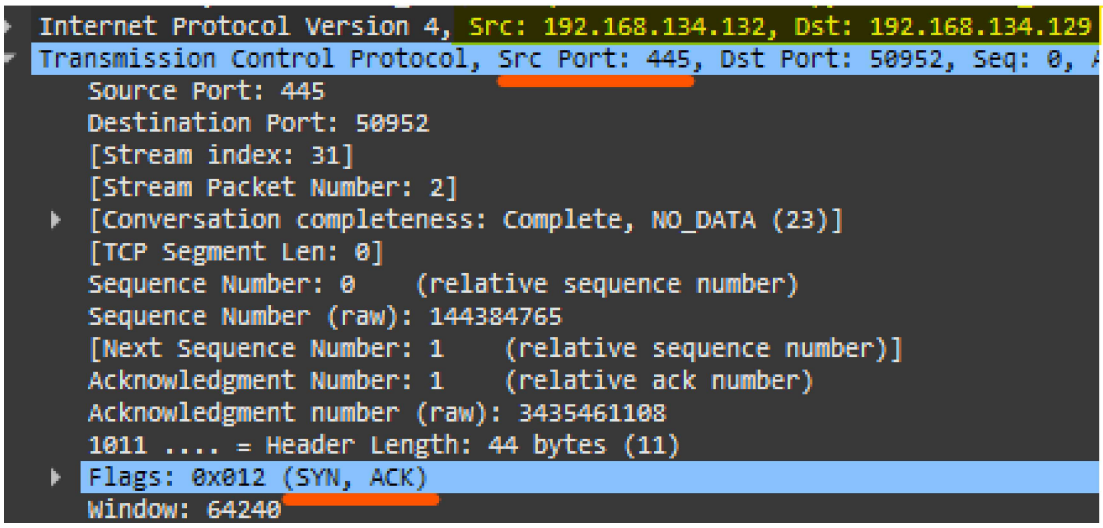
2161	**12174**	**57284**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2163	**11234**	**56462**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2165	**11000**	**59257**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2167	**10628**	**52129**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2169	**10616**	**37771**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2171	**26000**	**56643**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2173	**30000**	**39403**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2175	**34443**	**44485**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2177	**38080**	**40729**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2179	**22222**	**41009**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2181	**20222**	**32837**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2183	**20034**	**42669**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2185	**20031**	**48670**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2187	**19810**	**50945**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2189	**18881**	**37100**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2191	**50000**	**45978**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2193	**50013**	**45607**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2195	**57772**	**44999**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

2197	**62514**	**41840**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2199	**46823**	**34197**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2201	**44334**	**38694**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2203	**41524**	**43909**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2205	**41523**	**49035**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2207	**41025**	**39348**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2209	**38292**	**57884**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**
2211	**65535**	**42433**	**192.168.134.132 00:0c:29:7d:f3:78**	**192.168.134.129 00:0c:29:3f:20:31**

The attacker conducted the port scan by sending SYN packets to a multitude of ports on the 132 device. The attacker would determine whether the port was open by analyzing the flag in the TCP response packet. If the response packet contains a SYN,ACK flag, then a connection can be established and the port is deemed open. On the other hand, If the responding packet contains a RST flag, the connection is refused and the port is deemed closed. The table above reveals 288 closed ports which returned a RST flag as a result of the port scan.

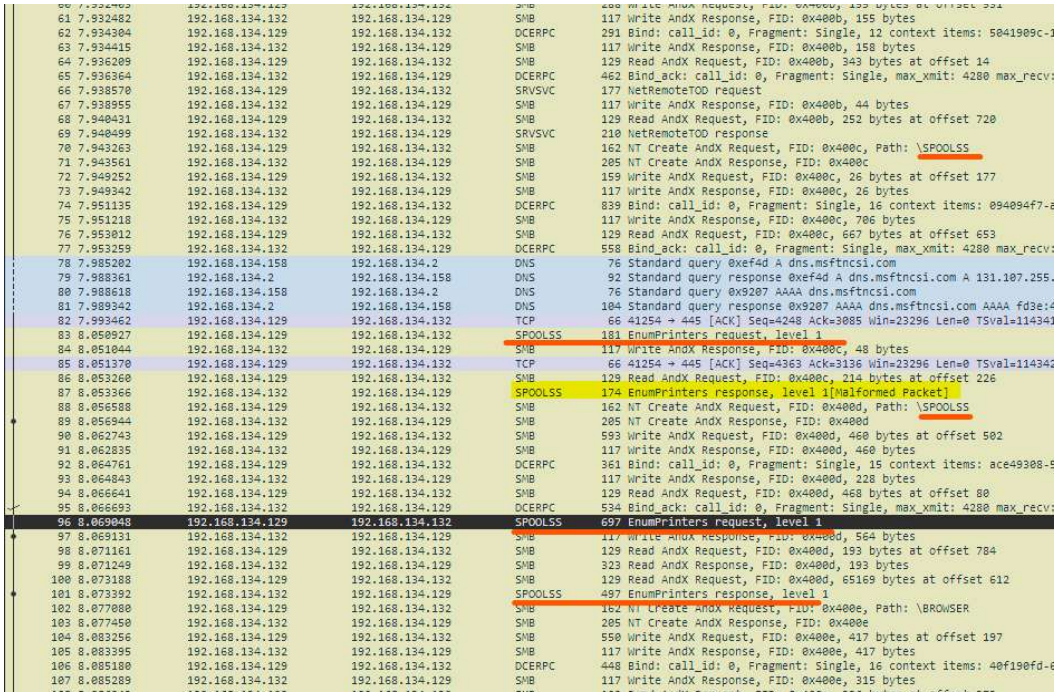
TCP RST Packets Resulting From Closed Ports.

Through my analysis of the response packets, I determined that the scan returned 3 open ports: Port 135, 139, and 445. Port 135 is used for RPC (Remote Procedure Call), which is used in Windows environments for remote client-server connections. The other two ports are SMB ports 445 and 139. SMB is used for file sharing between local network devices by enabling interprocess communication, which, in turn, allows applications and services to communicate with each other. Through SMB, core network services such as file, print, and device sharing are enabled.



Open Port 445 as Shown by SYN, ACK Response.

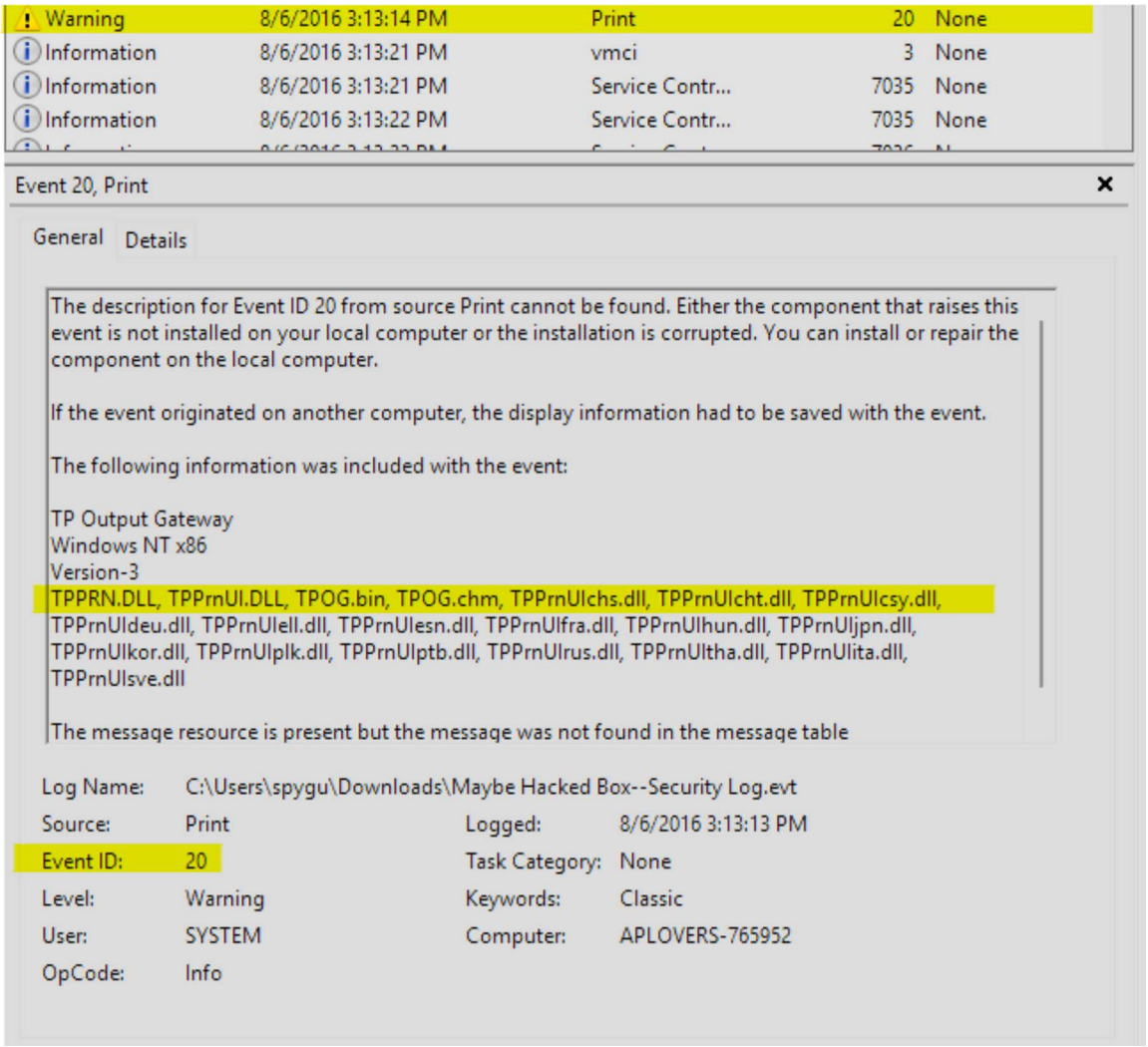
Finding port 445 open is expected as in my initial overview of the pcap, I found several pockets of SMB traffic between the 129 and 132 devices. Upon further analysis of the SMB traffic, I found several references to printer traffic through artifacts such as the SPOOLS protocol, enum printer requests, and file operations such as NOT Create AndX and Write AndX commands, which indicate that the client is attempting to enumerate available printers, establish connections to the print spooler, and potentially submit or manage print jobs.



SMB Spools Traffic.

I then checked the event logs for printer logs or warnings. In analyzing the event logs, I found several alarming entries that point to issues with a printer system and its interaction with SMB traffic. Event ID

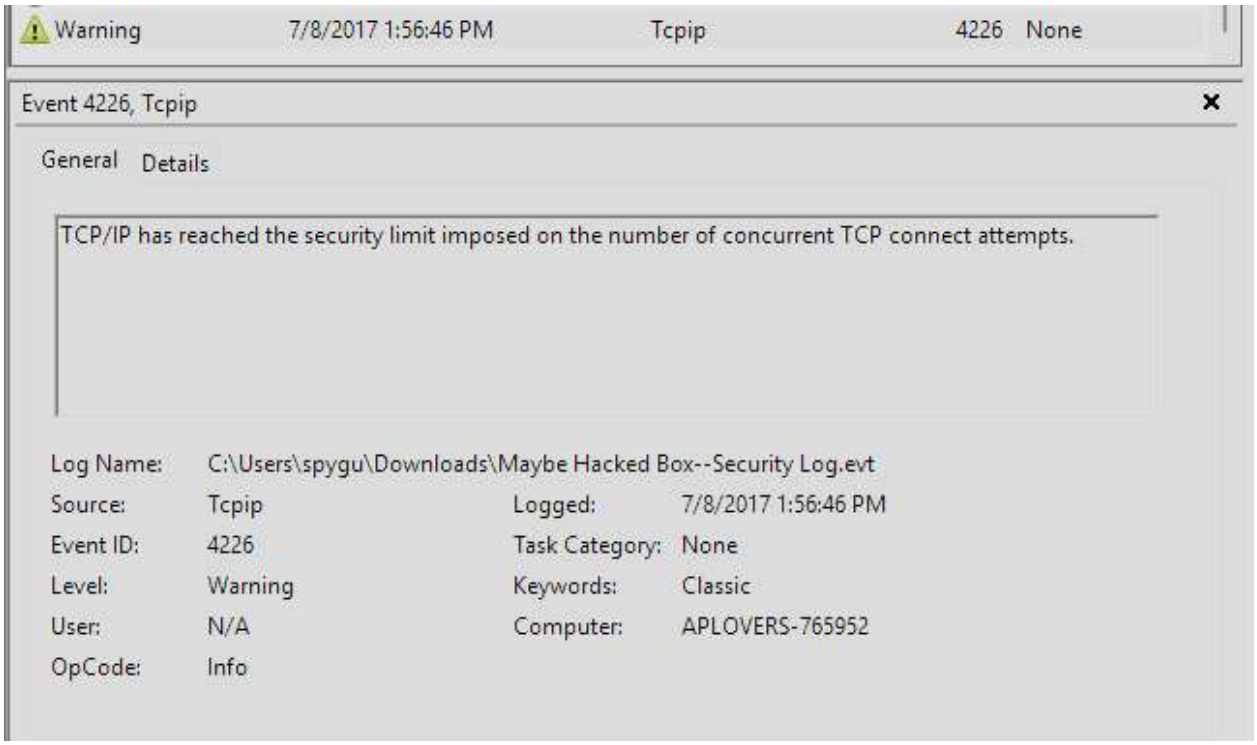
20 indicates a problem with the printer driver, particularly related to the TP Output Gateway system, which involves various dynamic link libraries (DLLs) and configuration files. The logs reference multiple versions of files such as PSCRIPT5.DLL, PS5UI.DLL, TPPS.PPD, etc., which reveal that different components of the printing system may be misconfigured and acting abnormally. Additionally, entries related to TPPRN.DLL, TPPrnUI.DLL, and several localized versions of TPPrnUI files point to potential issues with the printer interface and user interface components. Because the SMB traffic is originating from the attacker, the security event logs show abnormal behavior in the printer libraries, and there are signs of malformed packets, it is necessary to analyze the libraries to ensure their legitimacy and confirm that the attacker isn't using malicious files as a backdoor to gain access to the device.



Event ID 20: Printer DLL Warnings.

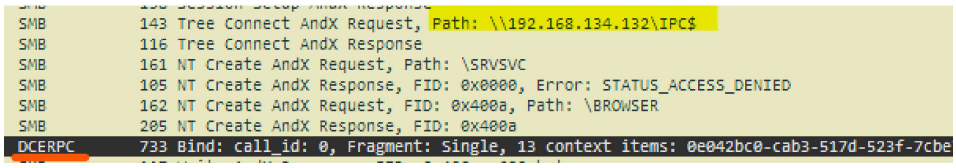
Event ID 4226 indicates a TCP/IP warning triggered when the system reaches the security limit for concurrent connection attempts.The log reads, “TCP/IP has reached the security limit imposed on the number of concurrent TCP connect attempts”. This warning is generated when a system makes too many concurrent outgoing TCP connection attempts in a short period. Windows imposes a limit on these attempts to protect against port scanning or worm propagation. As previously mentioned, the 129 device

did conduct a port scan on the 132 device. Therefore, this warning shows further proof of port scanning by the 129 device.



Event ID 4226: TCP Security Limit.

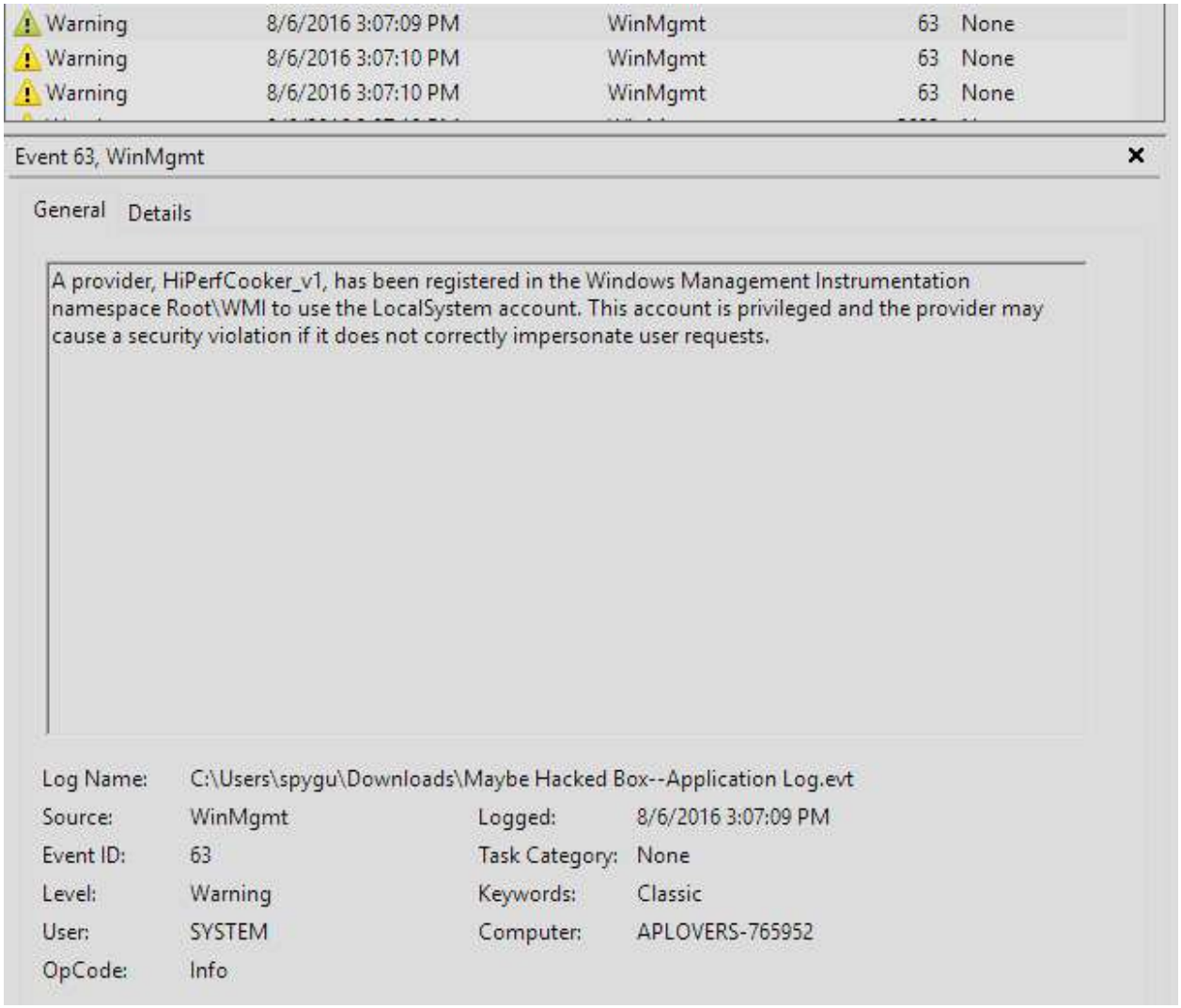
Other notable artifacts I found in my investigation include IPC$ and DCERPC. In the SMB traffic, the user was attempting to connect to an IPC$ share, which allows anonymous users to perform activities like enumerating domain accounts and network shares. This can be a common target for attackers seeking information about network resources. Additionally, DCERPC (Distributed Computing Environment Remote Procedure Call) was observed, which enables distributed software to operate as if it were running on the same system.
Therefore, the SMB traffic reflects an attempt to exploit or gather information about network shares and printer services, which ties into the previously mentioned reconnaissance conducted via a port scan of the ports on the 132 device.



IPC$ Share and DCERPC.

Analyzing the application logs, I found multiple warnings (Event ID 63) related to Windows Management Instrumentation (WMI) providers being registered to use the LocalSystem account, which has elevated privileges. Specifically, the provider HiPerfCooker_v1 and CmdTriggerConsumer were registered in the Root\WMI and Root\cimv2 namespaces, respectively. This is concerning because improper impersonation of user requests by these privileged providers can lead to security violations and potential exploitation.

Attackers could abuse these providers to execute commands or scripts with system-level privileges, which is a common technique for maintaining persistence or performing privilege escalation on a compromised system.



Event ID 63: Root\WMI.

Finally, through an NBNS refresh request, I pieced together the final parts of the investigation. Since all of the DNS queries in the packet capture were being sent to 192.168.134.2, I determined that the .2 device was the DNS server.

Therefore, I concluded that on frame 2217, the 132 device requested an NBNS refresh from the DNS server for the APLOVERS machine to check if the system is still registered and available on the network. As a result, the 132 device is not APLOVERS and is not the owner of the event logs. Instead, the 129 device is APLOVERS, as the event logs (Event ID 4226) show signs of port scanning, which was found to have been initiated by the 129 device in both Snort and Wireshark.

NBNS Refresh.

Summary of What Happened:

I was provided with a packet capture from July 8th, 2017, recorded between 2:09 PM and 2:13 PM, capturing 2364 packets from a Windows device. The majority of the traffic—about 91%—was concentrated between the devices with IP addresses 192.168.134.129 and 192.168.134.132. This unusually dense communication warranted further investigation.

Upon analysis, it became clear that the 129 device generated most of the traffic, initiating 66% of the packets. Using Snort to analyze the pcap, I found two types of alerts: “Consecutive TCP small segments exceeding threshold” and “TCP Port Scan – Attempted Information Leak”. These alerts suggested that the 129 device was sending a high volume of small TCP packets to overwhelm the 132 device and performing a port scan to gather information. The exceeded threshold alert is consistent with system overwhelm tactics where excessive traffic can cause memory and buffer issues.

Further examination of the TCP stream between the 129 and 132 devices revealed runtime errors and heap errors in the logs. These errors, such as “unable to initialize heap” and “CRT not initialized”, indicate that the 132 device was overwhelmed by the traffic. Additionally, I observed “TCP Window Full” and “TCP ZeroWindow” warnings, showing that the 132 device's buffer was full and could no longer accept data. This evidence confirms that the 129 device was actively overwhelming the 132 device through TCP traffic.

A detailed examination of the SMB traffic revealed further malicious activity. The 129 device was attempting to interact with printer services on the 132 device, as shown by SPOOLS protocol references, enum printer requests, and SMB commands like “NT Create AndX” and “Write AndX”. These interactions suggest an attempt to enumerate printers, submit print jobs, or exploit vulnerabilities in the print service.

In the event logs, I found Event ID 20 indicating issues with the TP Output Gateway system and its associated DLLs (e.g., PSCRIPT5.DLL, TPPRN.DLL, TPPrnUI.DLL). These DLL warnings, coupled with the SMB traffic anomalies, suggest that the attacker may have been exploiting the printer system to gain access or persistence.

Additionally, Event ID 4226 warned of the system reaching its limit for concurrent TCP connection attempts, further confirming the port scanning activity initiated by the 129 device. This scan targeted 291 ports on the 132 device, with 3 ports found open: 135 (RPC), 139 (SMB over NetBIOS), and 445 (SMB over TCP).

In the application logs, Event ID 63 showed that WMI providers were registered with the LocalSystem account, a privileged context. This indicates potential abuse of WMI for persistence or privilege escalation by the attacker.

Finally, an NBNS Refresh request from the 132 device to the DNS server (192.168.134.2) confirmed that 192.168.134.132 was not the APLOVERS machine. Instead, the 129 device is APLOVERS, as it was responsible for the port scan and generated the concurrent TCP connection warning.

Conclusion: The 129 device (APLOVERS) initiated an attack on the 132 device involving port scanning, TCP flood attacks, and attempts to exploit SMB and printer services. This attack led to system resource exhaustion and potentially compromised the target's print services and WMI infrastructure.

Next Steps:

Due to abnormal findings in the packet capture and event logs, the APLOVERS-765952 (192.168.134.129) system appears to be compromised and is attempting lateral movement through reconnaissance (port scans) and malformed SMB packets, which it is sending to the 132 system. The APLOVERS logs reveal suspicious dynamic libraries (Event ID 20), possible privilege escalation (Event ID 63), and port scanning (Event ID 4226). Further signs of compromise include alerts generated by Snort (TCP Port Scan), confirming that APLOVERS is conducting a port scan on the 132 system. Snort also detected full TCP buffers caused by the 129 system (TCP small segments exceeding threshold), visible in Wireshark frames 254, 272, 642, 644, 1318, 1352, 1398, and 1399.

As a result, the APLOVERS system should be scanned for malicious files and rootkits, especially within the printer dynamic link libraries, and reimaged to remove any malicious content. Additionally, the 132 system (192.168.132.132) should be reimaged as well, as APLOVERS exchanged several packets with it, including malformed SMB packets (frame 2310) and SPOOLS/printer traffic. The 132 system was also the victim of port scanning by APLOVERS, which discovered open ports 135, 139, and 445. This led to the exploitation of port 445 for SMB traffic. The attacker exchanged several packets between itself and the open ports on the victim, so the 132 system should also be scanned for malicious files and reimaged if any malicious content is found.

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