Detecting Beaconing Malware

`Malware beaconing` is a technique we frequently encounter in our cybersecurity investigations. It refers to the periodic communication initiated by malware-infected systems with their respective command and control (C2) servers. The beacons, typically small data packets, are sent at regular intervals, much like a lighthouse sends out a regular signal.

In our analysis of beaconing behavior, we often observe several distinct patterns. The beaconing intervals can be fixed, jittered (varied slightly from a fixed pattern), or follow a more complex schedule based on the malware's specific objectives. We've encountered malware that uses various protocols for beaconing, including HTTP/HTTPS, DNS, and even ICMP (ping).

In this section, we will concentrate on detecting the beaconing behavior associated with a widely recognized Command and Control (C2) framework known as `Cobalt Strike` (in its default configuration).

Let's now navigate to the bottom of this section and click on "Click here to spawn the target system!". Then, access the Splunk interface at https://[Target IP]:8000 and launch the Search & Reporting Splunk application. The vast majority of searches covered from this point up to end of this section can be replicated inside the target, offering a more comprehensive grasp of the topics presented.

Additionally, we can access the spawned target via RDP as outlined below. All files, logs, and PCAP files related to the covered attacks can be found in the /home/htb-student and /home/htb-student/module_files directories.

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```
MisaelMacias@htb[/htb]$ xfreerdp /u:htb-student /p:'HTB_@cademy_stdnt!' /v:[Target IP] /dynamic-res
```

Related Evidence

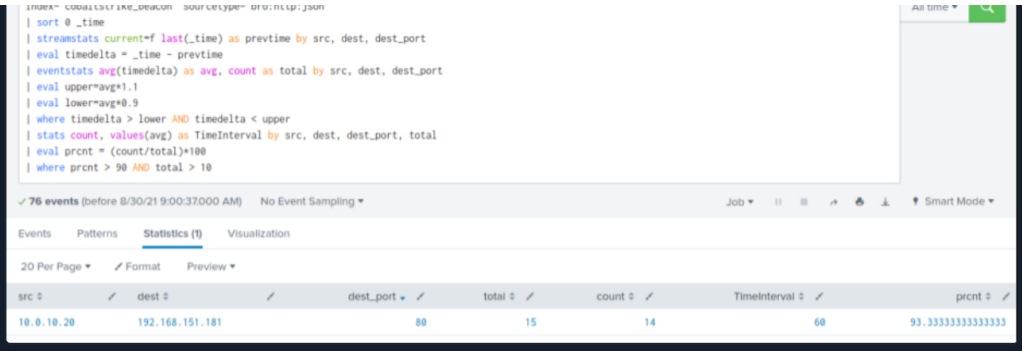
- **Related Directory:** `/home/htb-student/module_files/cobaltstrike_beacon`
- **Related Splunk Index:** `cobaltstrike_beacon`
- **Related Splunk Sourcetype:** `bro:http:json`

Detecting Beaconing Malware With Splunk & Zeek Logs

Now let's explore how we can identify beaconing, using Splunk and Zeek logs.

Detecting Beaconing Malware

```
index="cobaltstrike_beacon" sourcetype="bro:http:json"
| sort 0 _time
| streamstats current=f last(_time) as prevtime by src, dest, dest_port
| eval timedelta = _time - prevtime
| eventstats avg(timedelta) as avg, count as total by src, dest, dest_port
| eval upper=avg*1.1
| eval lower=avg*0.9
| where timedelta > lower AND timedelta < upper
| stats count, values(avg) as TimeInterval by src, dest, dest_port, total
| eval prcnt = (count/total)*100
| where prcnt > 90 AND total > 10
```



Search Breakdown:

- `index="cobaltstrike_beacon" sourcetype="bro:http:json"`: Selects the data from the `cobaltstrike_beacon` index and filters events of type `bro:http:json`, which represent Zeek HTTP logs.
- `| sort 0 _time`: Sorts the events in ascending order based on their timestamp (`_time`).
- `| streamstats current=f last(_time) as prevtime by src, dest, dest_port`: For each event, calculates the previous event's timestamp (`prevtime`) grouped by source IP (`src`), destination IP (`dest`), and destination port (`dest_port`).
- `| eval timedelta = _time - prevtime`: Computes the time difference (`timedelta`) between the current and previous events' timestamps.
- `| eventstats avg(timedelta) as avg, count as total by src, dest, dest_port`: Calculates the average time difference (`avg`) and the total number of events (`total`) for each combination of `src`, `dest`, and `dest_port`.
- `| eval upper=avg*1.1`: Sets an upper limit for the time difference by adding a `10%` margin to the average.
- `| eval lower=avg*0.9`: Sets a lower limit for the time difference by subtracting a `10%` margin from the average.
- `| where timedelta > lower AND timedelta < upper`: Filters the events where the time difference falls within the defined upper and lower limits.
- `| stats count, values(avg) as TimeInterval by src, dest, dest_port, total`: Counts the number of events and extracts the average time interval for each combination of `src`, `dest`, `dest_port`, and `total`.
- `| eval prcnt = (count/total)*100`: Calculates the percentage (`prcnt`) of events within the defined time interval limits.
- `| where prcnt > 90 AND total > 10`: Filters the results to only include those where more than `90%` of the events fall within the defined time interval limits, and there are more than `10` total events.

UK 138ms

Terminate Pwnbox to switch location

Start Instance

∞ / 1 spawns left

Waiting to start...

Enable step-by-step solutions for all questions

Questions

Answer the question(s) below to complete this Section and earn cubes!

Download VPN Connection File

Target(s): Click here to spawn the target system!

+ 1 Use the "cobaltstrike_beacon" index and the "bro:http:json" sourcetype. What is the most straightforward Splunk command to pinpoint beaconing from the 10.0.10.20 source to the 192.168.151.181 destination? Answer format: One word

timechart

Submit

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