In The Name Of God

Ping Of Death Attack Implementation Report file

Network Security Course Homework

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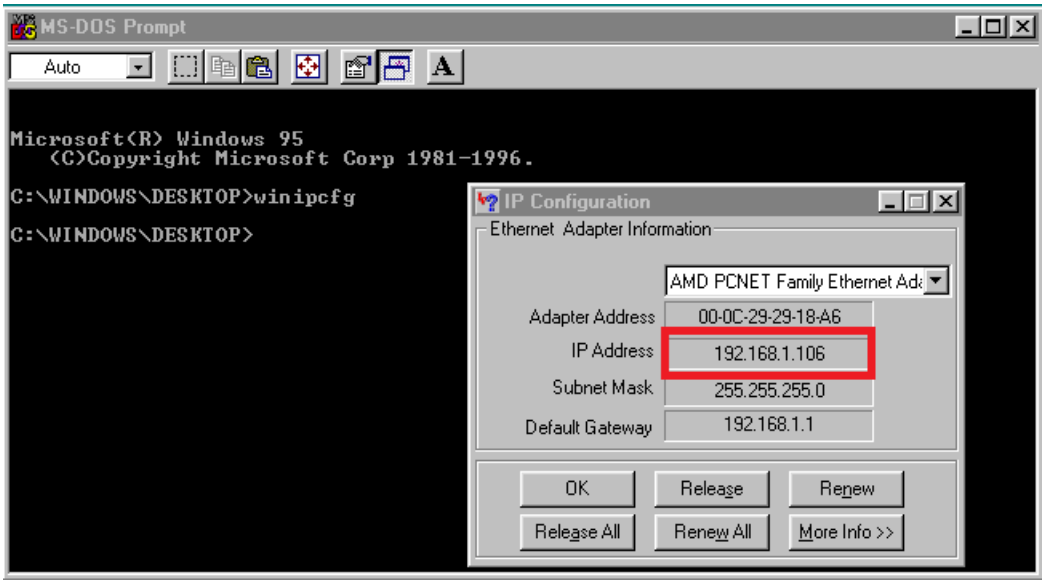
1 Introduction

A Ping of Death attack, also known as ”long ICMP”, is a denial-of-service (DoS) attack, in which the attacker aims to disrupt a targeted machine by sending a packet larger than the maximum allowable size, causing the target machine to freeze or crash. Basically, the ping of death attack tries to crash, reboot or other-wise kill a systems by sending a ping of a certain size from a remote machine. This attack was first introduced in 1996, and it terrorized the world for about a year. By the end of 1997, operating system vendors had made patches available to avoid the ping of death. Still, many Web sites continue to block Internet Control Message Protocol (ICMP) ping messages at their fire-walls to prevent any future variations of this kind of denial of service attack. In this task, I tried to replicate this attack on the current existing version of Linux and Windows remote machine.

2 Implementation

For implementation we need OS older than 1998 so I have searched for operating systems that are vulnerable to this kind of attack and I have installed Windows 95 that is latest version of windows that is Vulnerable:



2.1 vulnerable OS’s

According to the year of Os’s , **windows 95**, **windows NT 4** without service pack, **Linux with kernel 2.0.23** and older versions. I have tried to install older versions but in VmWare I could install Winodws95 and Windows NT 4.

2.2 Attempt 1: Naive attempt

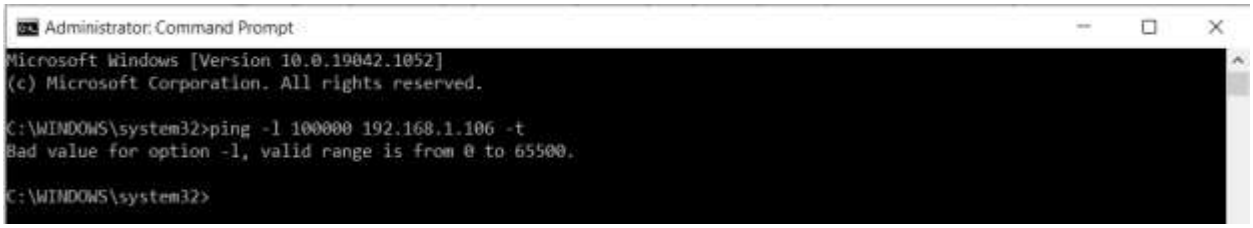
First I tried to attack the victim by sending him a loop of ping requests with a size of 65500 using the code below:

```
Ping −l 65000  target_ip_addr −t
```

This did put some extra pressure on the network. But this is not quite ping of death attack as in this attack the size of the ping should be greater than its normal size. Then i tried to send a larger size ping (100000 bytes) using this code in the command prompt a of windows:

```
Ping −l 10000  target_ip_addr −t
```

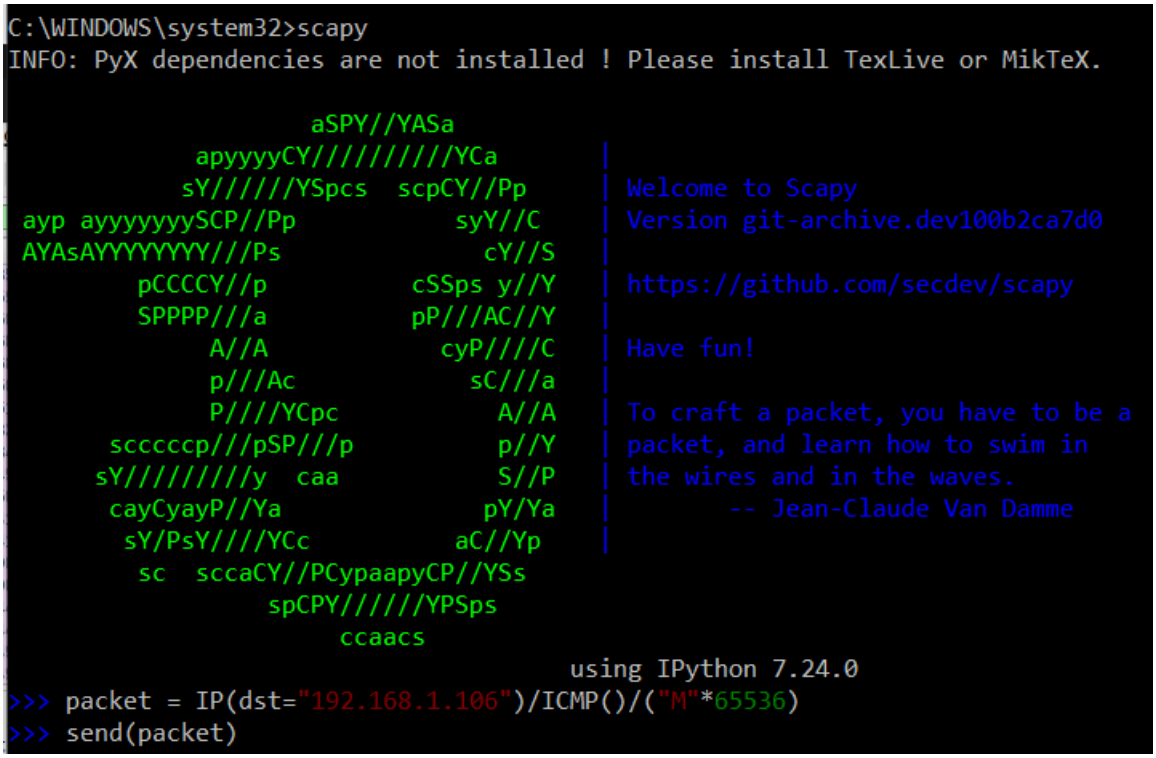
But this command is not executed stating that it violates the maximum range of ping.

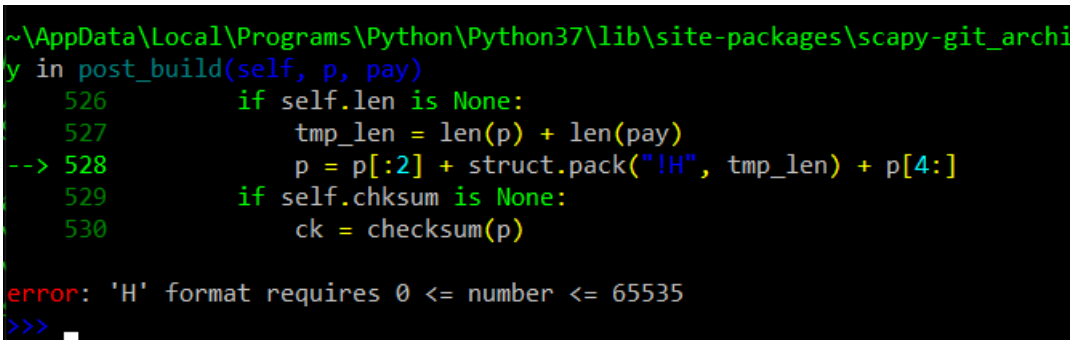


This gives us the finding that we can not send ping packets larger than 65500byte via command prompt or powershell’s shell commands directly. The network does not allow us to do that.

2.3 Attempt 2: Using Scapy

I then tried to send large ping packets using Scapy :

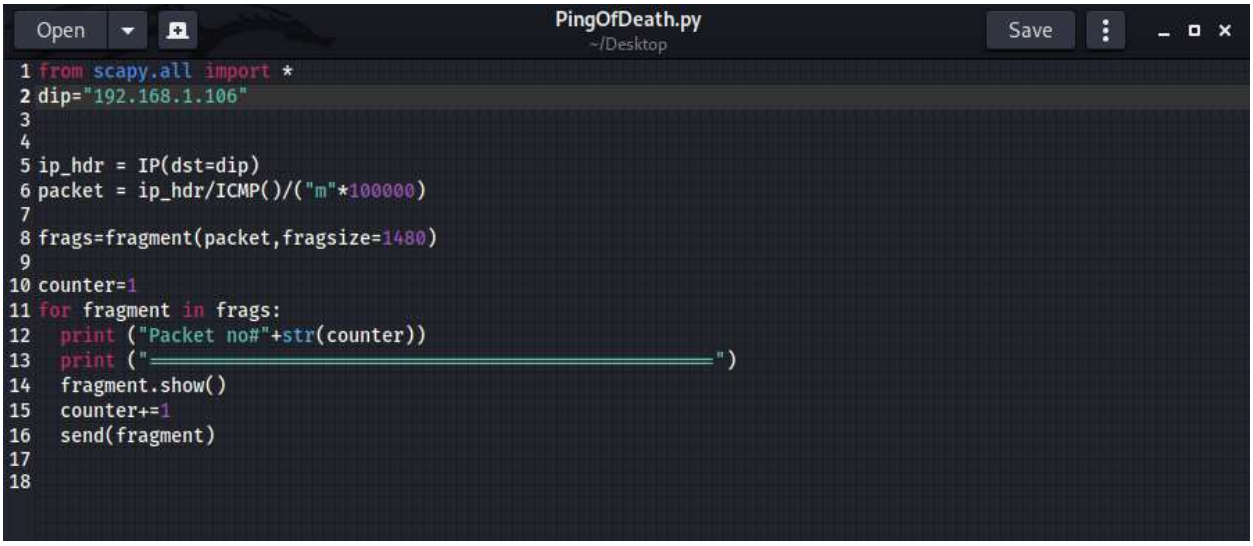




As you can see in screen shot , scapy do not allow to send packets larger than 65535 too .

2.4 Fragmentation Attempt

After the two failed attempts we see that sending a ping request larger than65500 bytes through ethernet is not possible. So I tried a different approach of fragmenting the ping and then sending it to the victim computer. The main idea behind this approach is that an IP datagram of 65536 bytes or greater is illegal, but possible to create owing to the way the packet is fragmented (broken into chunks for transmission). When the fragments are reassembled at the other end into a complete packet, it overflows the buffer on some systems, causing (variously) a reboot, panic, hang, and sometimes even having no effect at all. Note that it is possible to send an illegal echo packet with more than 65507octets of data due to the way the fragmentation is performed. The fragmentation relies on an offset value in each fragment to determine where the individual fragment goes upon reassembly. Thus on the last fragment, it is possible to combine a valid offset with a suitable fragment size such that (offset + size)¿ 65535. Since typical machines don't process the packet until they have all fragments and have tried to reassemble it, there is the possibility for overflow of 16 bit internal variables, which can lead to system crashes. Here I used this part of the code to implement the idea:

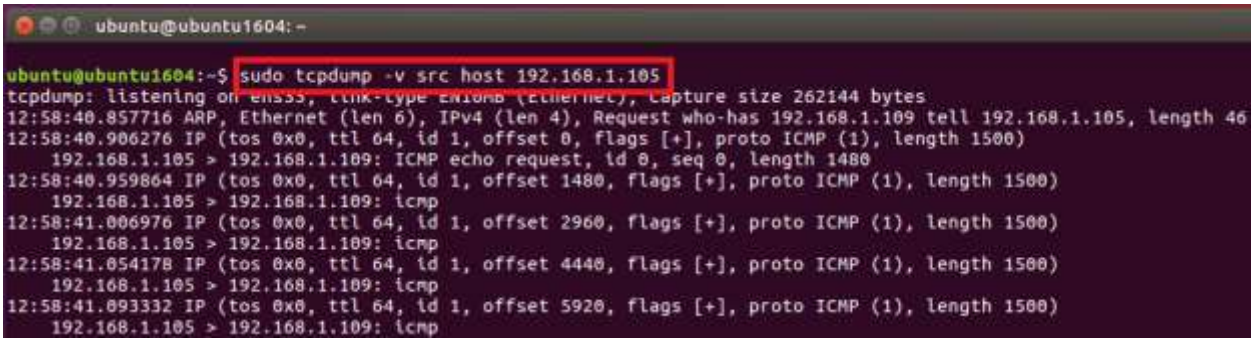


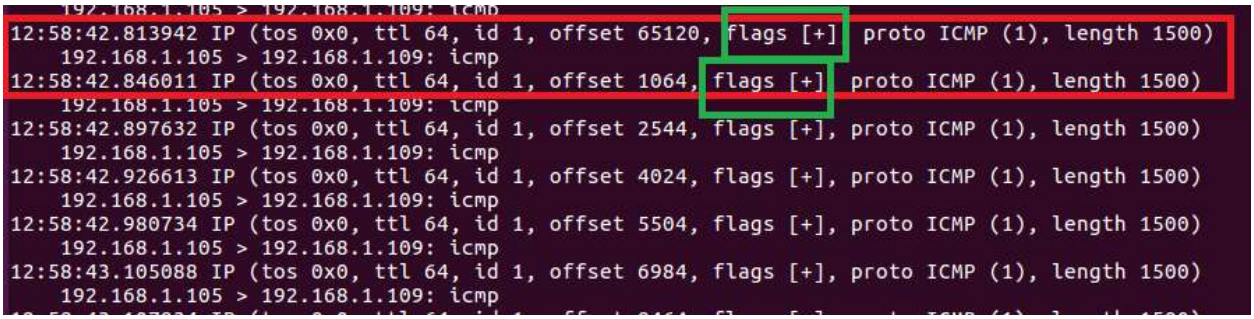
I was not able to crash target system, maybe it patched but I couldn't install windows with older version of this and also I have tested this for Windows NT 3.1 and didn't get answer too.

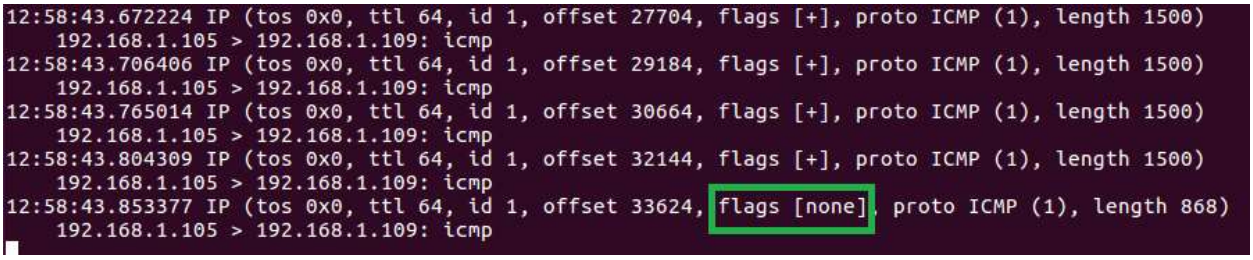
3 Was the attack Successful?

For testing that attack was successful or not , we use wireshark and tcpdump to see that packets are fragmented and received at target system but target system can detect this and treat to rest of packet (>65535) as new packet.

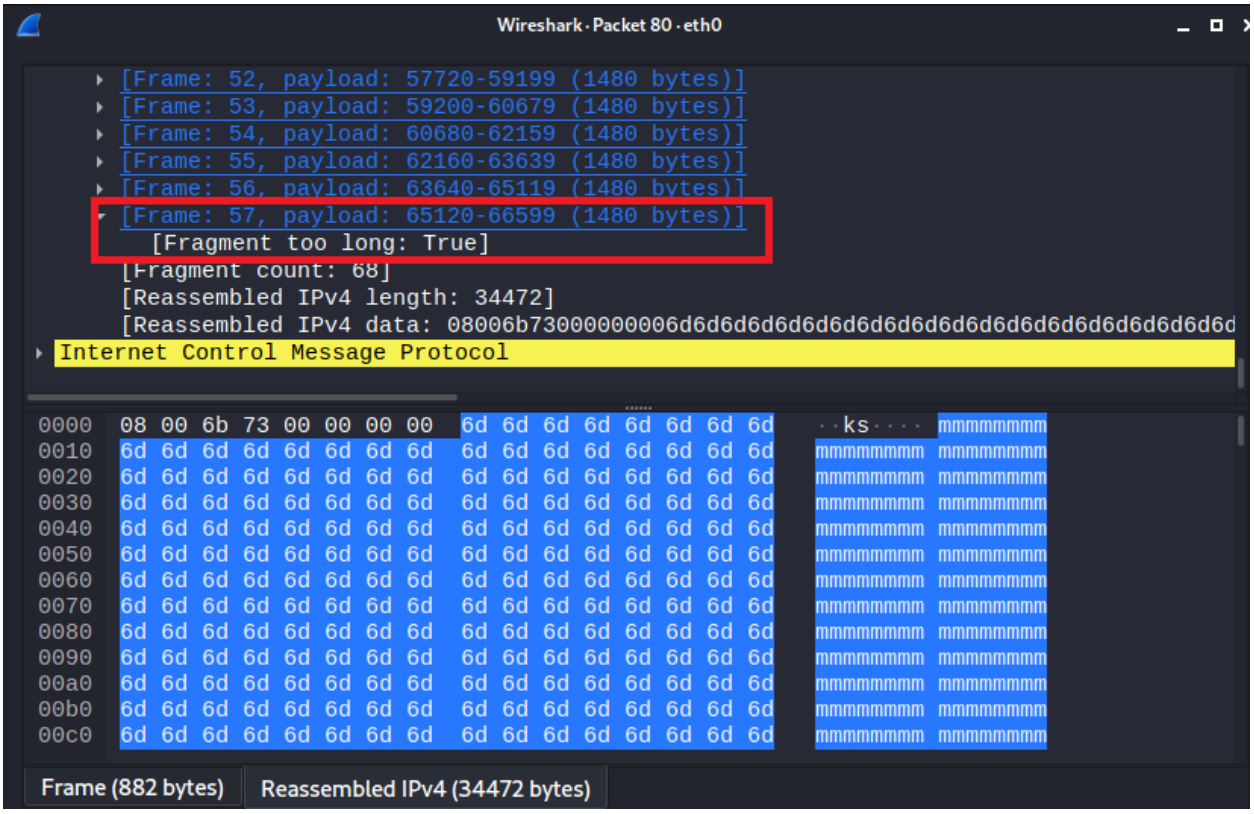
I have tested attack for an Ubuntu and using tcpdump on target, it captures packets below :







As you can see in images, fragments are received in target system and when it wants to get larger than 65535 , it is treated as new one but flags[+] shows that fragments are correctly generated and have been sent to target system and at the end it ends with flags[none].



Using wireshark we can see again that fragments are send correctly but os can detect it and Fragment too long is true for fragments larger than 65535.

So, In terms of simulating the attack, the project is successful. It has successfully send a ping packet larger than 65120 bytes. The proof of this is that the flag is still [+] when the offset became 65120 to 1064.It proves that the network still treats it as a part of the ping packet. Also, when the second packet reaches its end, it's flag becomes "[none]",which indicates that the packet has ended. But the OS is considering it as a different packet as a counter measure. So success in terms of disrupting the normal state of the victim machine, was certainly not achieved.

Video recorded for simulating attack :

https://iutbox.iut.ac.ir/index.php/s/ZRPTLjP83y54cYd

Codes are available in :

https://github.com/AmirMansurian/PingOfDeath-Attack