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Lab 12

Quick Qanda

1. What is meant by a *half-open* scan?
    a. A scan is half open if the client does not ack the servers response.
2. What is the significance of a port number?
    a. Some port numbers typically used by specific protocols. For example ssh usually uses port 22. Http uses port 80, and https uses 443.
3. Is there anything stopping you from running SSH on something other than port 22?
    a. No smiley face
4. How could a firewall easily detect a port scan?
    a. If someone tries port 1, then port 2, then port 3, etc. in sequential order the firewall could see that and then add them to the deny list.
5. In what ways could an attacker make a port scan stealthier?
    a. The attacker could scan the ports in a random order.

Local Enumeration

It is very important to be aware of what services are running on your servers. Since there is a local firewall running, you may also want to scan from an external host to see which ports are "open" to the public.

A. Install `nmap` (network mapper) on `node1` and `main`

B. What ports are open locally on `node1`?

    a. `sudo nmap -sS -p1-4096 127.0.0.1`

C. Does this match the output from the `ss` command?

    a. Almost all of the ports match but we can see an extra port in ss. We see 53 in ss but not in nmap.

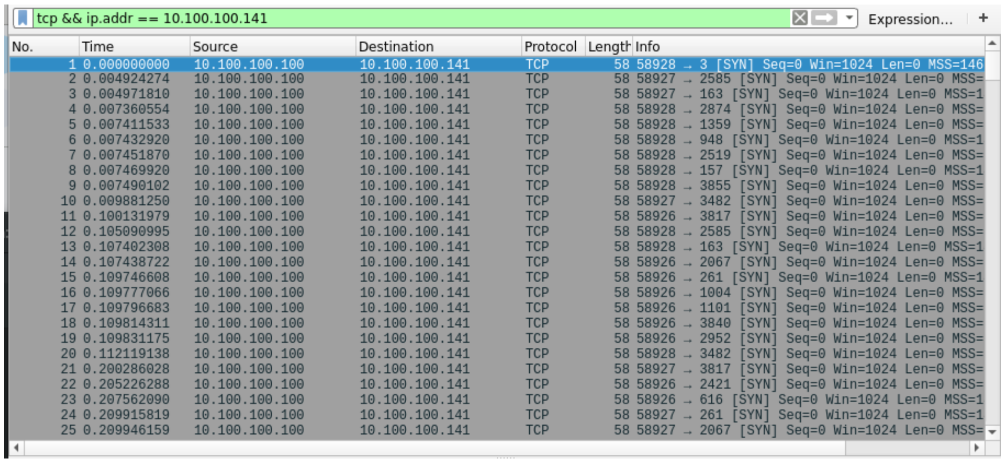
D. Using `ss`, are there any UDP sockets listening?

    a. There are no listening UDP sockets, they are all "UNCONN".

Non-local Enumeration

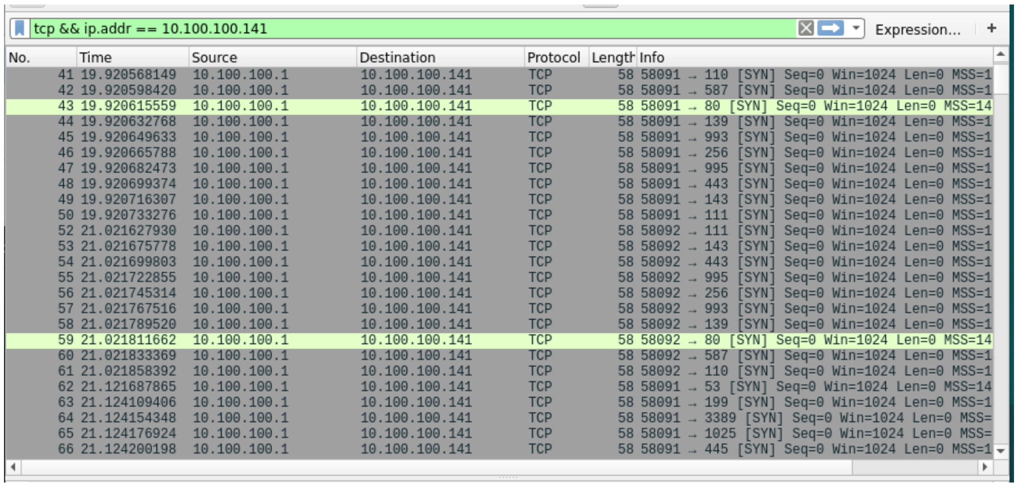
When you run a port scan, you are attempting to connect to the host. Many firewall appliances can detect a port scan, can you?

1. On `node1`, open Wireshark and keep an eye out for someone scanning you.
    1. Can you tell that your lab partner is port scanning this machine?
        i. yes
    2. Is there an order to which ports are checked by `nmap`?
        i. It looks pretty random
    3. On ports that were open, did nmap complete the three-way handshake?
        i. No.
2. Meanwhile, from `main`, scan TCP ports 1-4096 on `node1`
    1. What ports are open?
        i. 22, 80, 443
    2. Are the results different than the scan results in *Local Enumeration*?
        i. Yea. We found less ports.
3. nmap claims to have some super sneaky scan methods, look through `nmap --help` and try out various options
    1. What options did you try?
        i. -S to spoof the source address
        ii. --badsum to include a bogus "checksum"
    2. What shows up in Wireshark for each one?
        i. When we spoofed, it showed the address we spoofed started port scanning instead of our own address. Professor Scrivnor port scanned us :(.



```
tcp && ip.addr == 10.100.100.141

No.   Time          Source          Destination     Protocol Length Info
    1 0.000000000   10.100.100.100  10.100.100.141  TCP      58 58928 → 3 [SYN] Seq=0 Win=1024 Len=0 MSS=146
    2 0.004924274   10.100.100.100  10.100.100.141  TCP      58 58927 → 2585 [SYN] Seq=0 Win=1024 Len=0 MSS=
    3 0.004971810   10.100.100.100  10.100.100.141  TCP      58 58927 → 163 [SYN] Seq=0 Win=1024 Len=0 MSS=1
    4 0.007360554   10.100.100.100  10.100.100.141  TCP      58 58928 → 2874 [SYN] Seq=0 Win=1024 Len=0 MSS=
    5 0.007411533   10.100.100.100  10.100.100.141  TCP      58 58928 → 1359 [SYN] Seq=0 Win=1024 Len=0 MSS=
    6 0.007432920   10.100.100.100  10.100.100.141  TCP      58 58928 → 948 [SYN] Seq=0 Win=1024 Len=0 MSS=1
    7 0.007451870   10.100.100.100  10.100.100.141  TCP      58 58928 → 2519 [SYN] Seq=0 Win=1024 Len=0 MSS=
    8 0.007469920   10.100.100.100  10.100.100.141  TCP      58 58928 → 157 [SYN] Seq=0 Win=1024 Len=0 MSS=1
    9 0.007490102   10.100.100.100  10.100.100.141  TCP      58 58928 → 3855 [SYN] Seq=0 Win=1024 Len=0 MSS=
   10 0.009881250   10.100.100.100  10.100.100.141  TCP      58 58927 → 3482 [SYN] Seq=0 Win=1024 Len=0 MSS=
   11 0.100131979   10.100.100.100  10.100.100.141  TCP      58 58926 → 3817 [SYN] Seq=0 Win=1024 Len=0 MSS=
   12 0.105090995   10.100.100.100  10.100.100.141  TCP      58 58928 → 2585 [SYN] Seq=0 Win=1024 Len=0 MSS=
   13 0.107402308   10.100.100.100  10.100.100.141  TCP      58 58928 → 163 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   14 0.107438722   10.100.100.100  10.100.100.141  TCP      58 58926 → 2067 [SYN] Seq=0 Win=1024 Len=0 MSS=
   15 0.109746608   10.100.100.100  10.100.100.141  TCP      58 58926 → 261 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   16 0.109777066   10.100.100.100  10.100.100.141  TCP      58 58926 → 1004 [SYN] Seq=0 Win=1024 Len=0 MSS=
   17 0.109796683   10.100.100.100  10.100.100.141  TCP      58 58926 → 1101 [SYN] Seq=0 Win=1024 Len=0 MSS=
   18 0.109814311   10.100.100.100  10.100.100.141  TCP      58 58926 → 3840 [SYN] Seq=0 Win=1024 Len=0 MSS=
   19 0.109831175   10.100.100.100  10.100.100.141  TCP      58 58926 → 2952 [SYN] Seq=0 Win=1024 Len=0 MSS=
   20 0.112119138   10.100.100.100  10.100.100.141  TCP      58 58928 → 3482 [SYN] Seq=0 Win=1024 Len=0 MSS=
   21 0.200286028   10.100.100.100  10.100.100.141  TCP      58 58927 → 3817 [SYN] Seq=0 Win=1024 Len=0 MSS=
   22 0.205226288   10.100.100.100  10.100.100.141  TCP      58 58926 → 2421 [SYN] Seq=0 Win=1024 Len=0 MSS=
   23 0.207562090   10.100.100.100  10.100.100.141  TCP      58 58926 → 616 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   24 0.209915819   10.100.100.100  10.100.100.141  TCP      58 58927 → 261 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   25 0.209946159   10.100.100.100  10.100.100.141  TCP      58 58927 → 2067 [SYN] Seq=0 Win=1024 Len=0 MSS=
```



```
tcp && ip.addr == 10.100.100.141

No.   Time          Source          Destination     Protocol Length Info
   41 19.920568149  10.100.100.1    10.100.100.141  TCP      58 58091 → 110 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   42 19.920598420  10.100.100.1    10.100.100.141  TCP      58 58091 → 587 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   43 19.920615559  10.100.100.1    10.100.100.141  TCP      58 58091 → 80 [SYN] Seq=0 Win=1024 Len=0 MSS=14
   44 19.920632768  10.100.100.1    10.100.100.141  TCP      58 58091 → 139 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   45 19.920649633  10.100.100.1    10.100.100.141  TCP      58 58091 → 993 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   46 19.920665788  10.100.100.1    10.100.100.141  TCP      58 58091 → 256 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   47 19.920682473  10.100.100.1    10.100.100.141  TCP      58 58091 → 995 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   48 19.920699374  10.100.100.1    10.100.100.141  TCP      58 58091 → 443 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   49 19.920716307  10.100.100.1    10.100.100.141  TCP      58 58091 → 143 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   50 19.920733276  10.100.100.1    10.100.100.141  TCP      58 58091 → 111 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   52 21.021627930  10.100.100.1    10.100.100.141  TCP      58 58092 → 111 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   53 21.021675778  10.100.100.1    10.100.100.141  TCP      58 58092 → 143 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   54 21.021699803  10.100.100.1    10.100.100.141  TCP      58 58092 → 443 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   55 21.021722855  10.100.100.1    10.100.100.141  TCP      58 58092 → 995 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   56 21.021745314  10.100.100.1    10.100.100.141  TCP      58 58092 → 256 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   57 21.021767516  10.100.100.1    10.100.100.141  TCP      58 58092 → 993 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   58 21.021789520  10.100.100.1    10.100.100.141  TCP      58 58092 → 139 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   59 21.021811662  10.100.100.1    10.100.100.141  TCP      58 58092 → 80 [SYN] Seq=0 Win=1024 Len=0 MSS=14
   60 21.021833369  10.100.100.1    10.100.100.141  TCP      58 58092 → 587 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   61 21.021858392  10.100.100.1    10.100.100.141  TCP      58 58092 → 110 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   62 21.121687865  10.100.100.1    10.100.100.141  TCP      58 58091 → 53 [SYN] Seq=0 Win=1024 Len=0 MSS=14
   63 21.124109406  10.100.100.1    10.100.100.141  TCP      58 58091 → 199 [SYN] Seq=0 Win=1024 Len=0 MSS=1
   64 21.124154348  10.100.100.1    10.100.100.141  TCP      58 58091 → 3389 [SYN] Seq=0 Win=1024 Len=0 MSS=
   65 21.124176924  10.100.100.1    10.100.100.141  TCP      58 58091 → 1025 [SYN] Seq=0 Win=1024 Len=0 MSS=
   66 21.124200198  10.100.100.1    10.100.100.141  TCP      58 58091 → 445 [SYN] Seq=0 Win=1024 Len=0 MSS=1
```

ii. The checksums of the messages sent did not add up correctly.