

Lab 2: Detect and Protect Against DoS and DDoS Attacks

Lab Scenario

DoS/DDoS attacks are one of the foremost security threats on the Internet; thus, there is a greater necessity for solutions to mitigate these attacks. Early detection techniques help to prevent DoS and DDoS attacks. Detecting such attacks is a tricky job. A DoS and DDoS attack traffic detector needs to distinguish between genuine and bogus data packets, which is not always possible; the techniques employed for this purpose are not perfect. There is always a chance of confusion between traffic generated by a legitimate network user and traffic generated by a DoS or DDoS attack. One problem in filtering bogus from legitimate traffic is the volume of traffic. It is impossible to scan each data packet to ensure security from a DoS or DDoS attack. All the detection techniques used today define an attack as an abnormal and noticeable deviation in network traffic statistics and characteristics. These techniques involve the statistical analysis of deviations to categorize malicious and genuine traffic.

As a professional ethical hacker or pen tester, you must use various DoS and DDoS attack detection techniques to prevent the systems in the network from being damaged.

This lab provides hands-on experience in detecting DoS and DDoS attacks using various detection techniques.

Lab Objectives

- Detect and protect against DDoS attacks using Anti DDoS Guardian

Overview of DoS and DDoS Attack Detection

Detection techniques are based on identifying and discriminating the illegitimate traffic increase and flash events from the legitimate packet traffic.

The following are the three types of detection techniques:

- **Activity Profiling:** Profiles based on the average packet rate for a network flow, which consists of consecutive packets with similar packet header information
- **Sequential Change-point Detection:** Filters network traffic by IP addresses, targeted port numbers, and communication protocols used, and stores the traffic flow data in a graph that shows the traffic flow rate over time
- **Wavelet-based Signal Analysis:** Analyzes network traffic in terms of spectral components

Task 1: Detect and Protect Against DDoS Attacks using Anti DDoS Guardian

Anti DDoS Guardian is a DDoS attack protection tool. It protects IIS servers, Apache servers, game servers, Camfrog servers, mail servers, FTP servers, VOIP PBX, and SIP servers and other systems. Anti DDoS Guardian monitors each incoming and outgoing packet in Real-Time. It displays the local address, remote address, and other information of each network flow. Anti DDoS Guardian limits network flow number, client bandwidth, client concurrent TCP connection number, and TCP connection rate. It also limits the UDP bandwidth, UDP connection rate, and UDP packet rate.

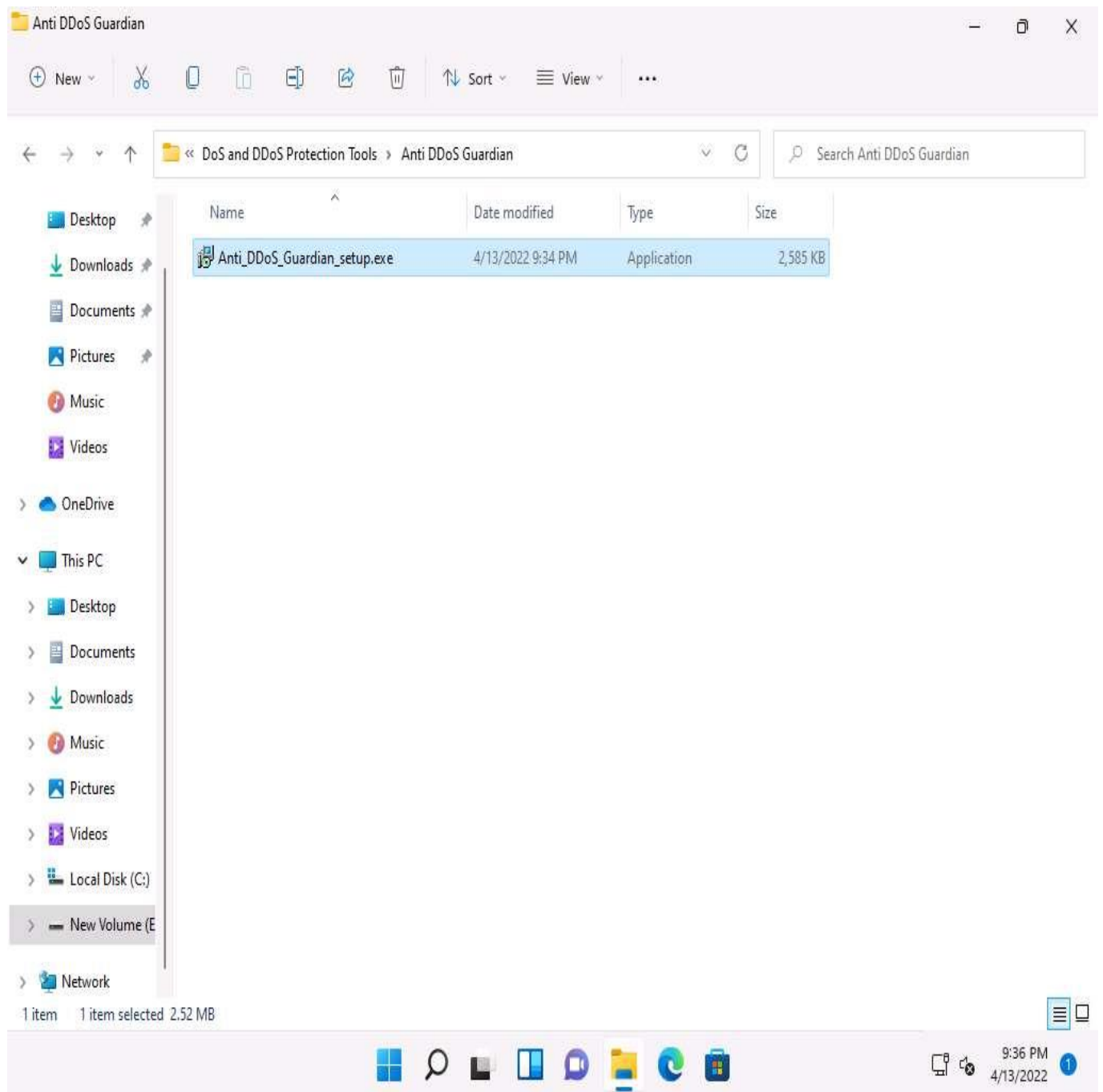
Here, we will detect and protect against a DDoS attack using Anti DDoS Guardian.

In this task, we will use the **Windows Server 2019** and **Windows Server 2022** machines to perform a DDoS attack on the target system, **Windows 11**.

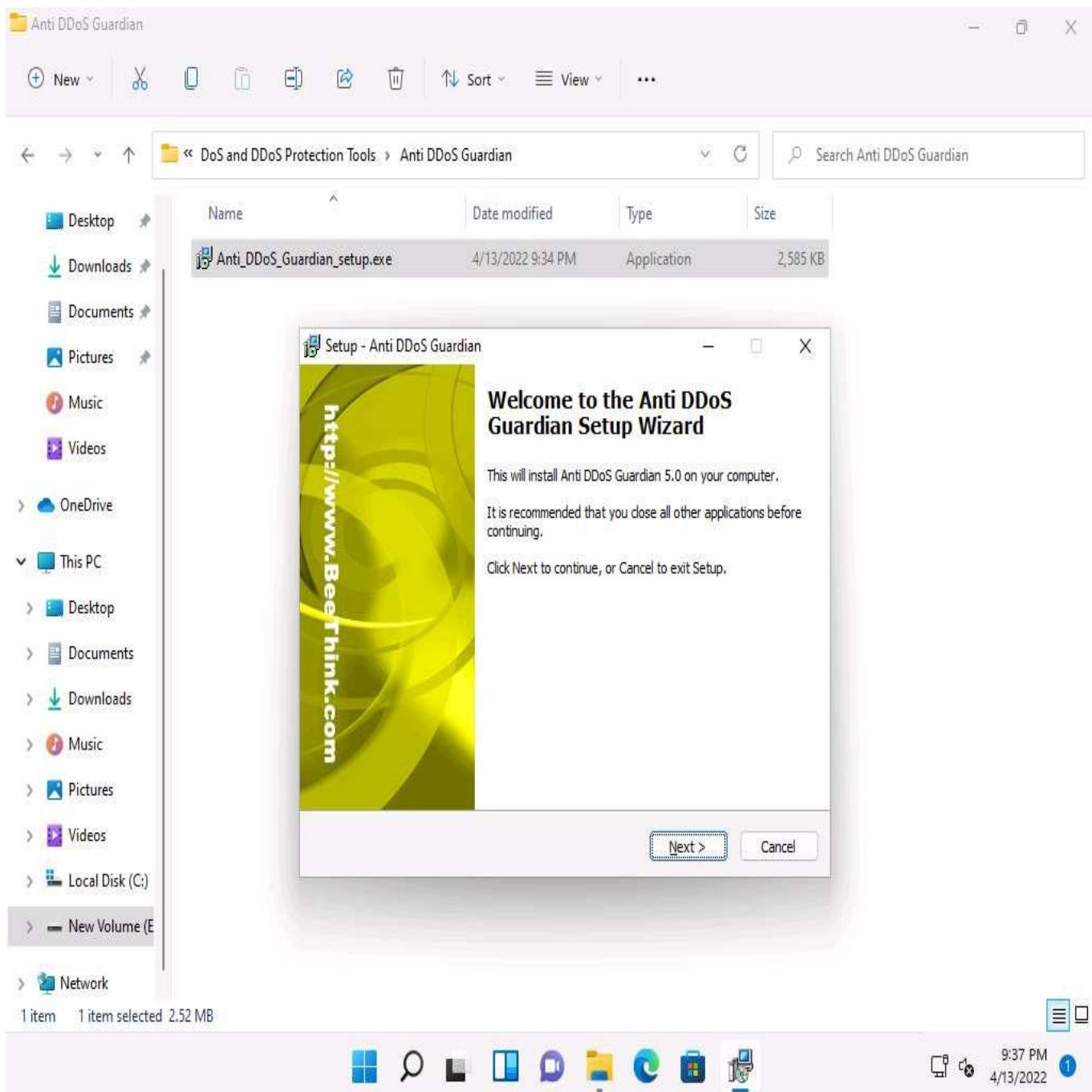
1. ☐ On the **Windows 11** machine, navigate to **E:\CEH-Tools\CEHv12 Module 10 Denial-of-Service\DoS and DDoS Protection Tools\Anti DDoS Guardian** and double click **Anti_DDoS_Guardian_setup.exe**.

If a **User Account Control** pop-up appears, click **Yes**.

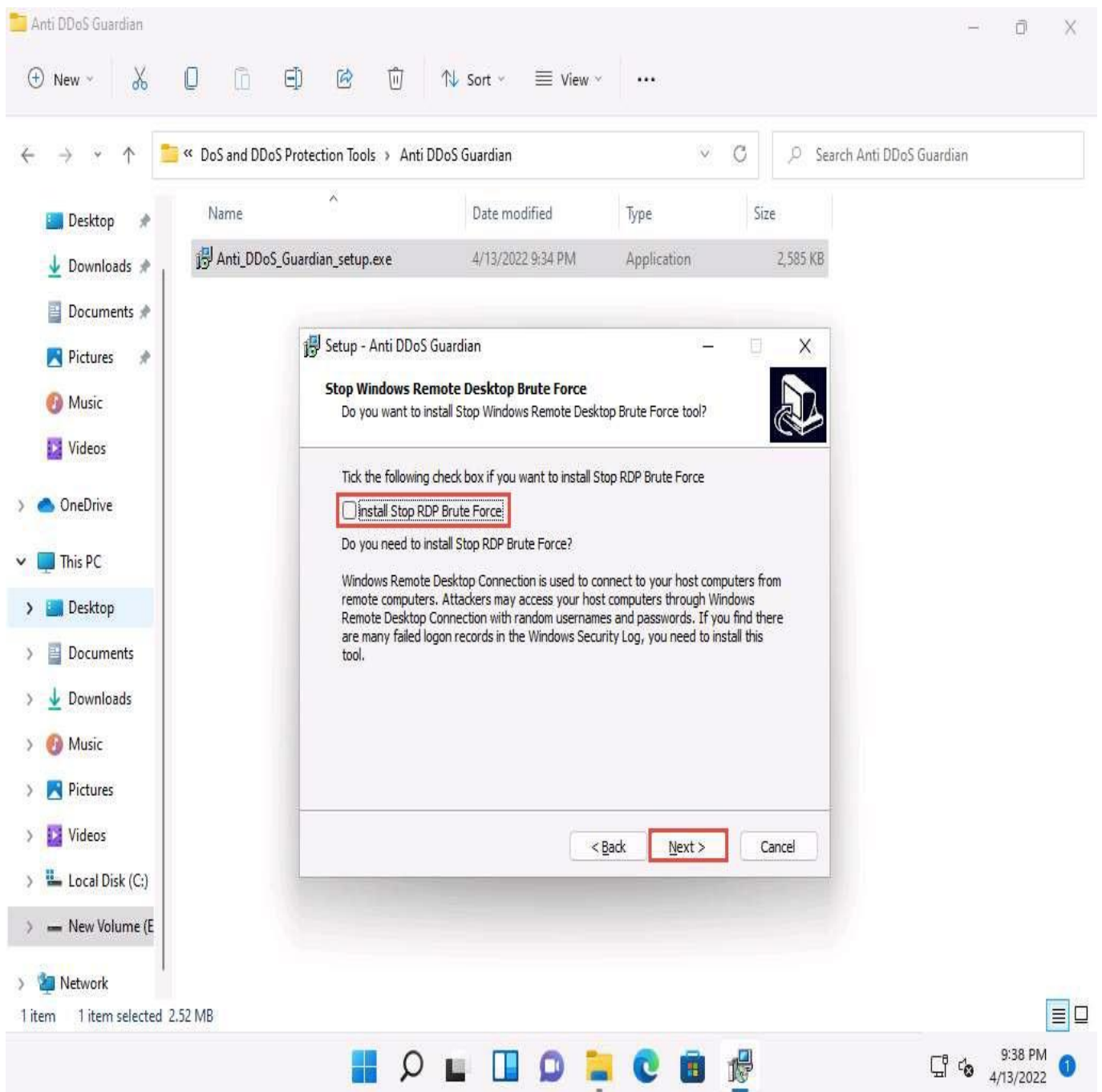
If an **Open File - Security Warning** pop-up appears, click **Run**.



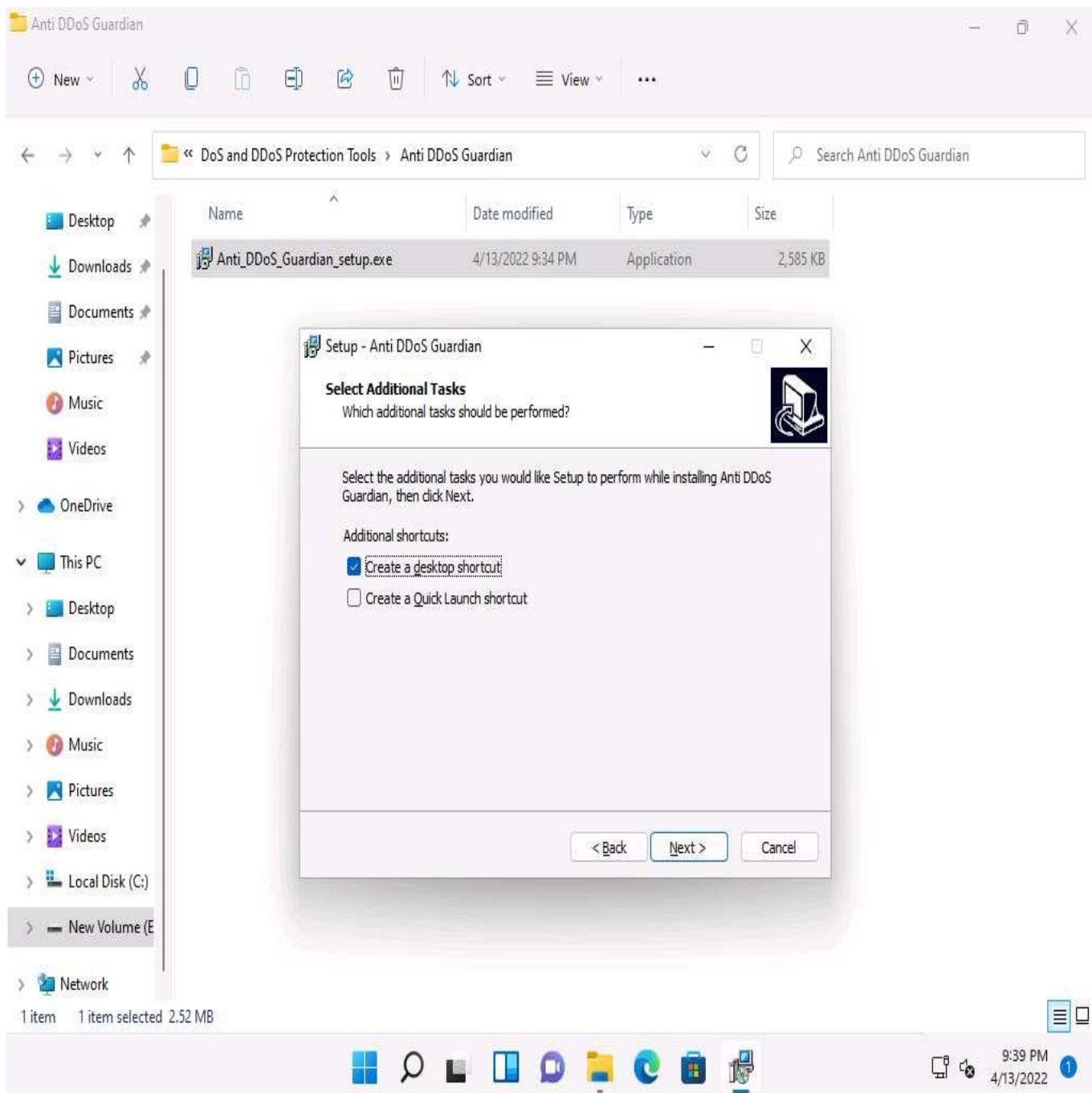
2. ☐ The **Setup - Anti DDoS Guardian window** appears; click **Next**. Follow the wizard-driven installation steps to install the application.



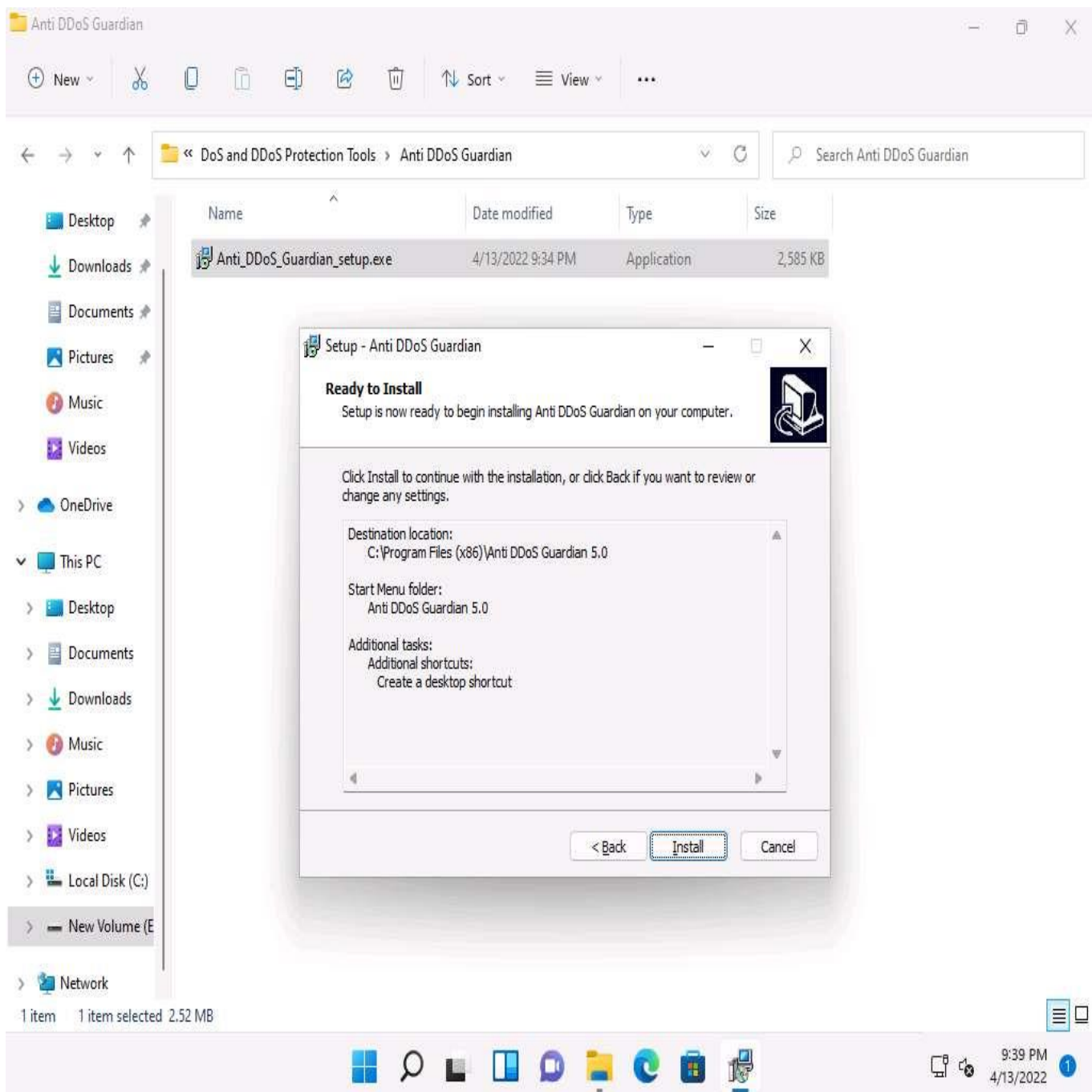
3. ☐ In the **Stop Windows Remote Desktop Brute Force** wizard, uncheck the **install Stop RDP Brute Force** option, and click **Next**.



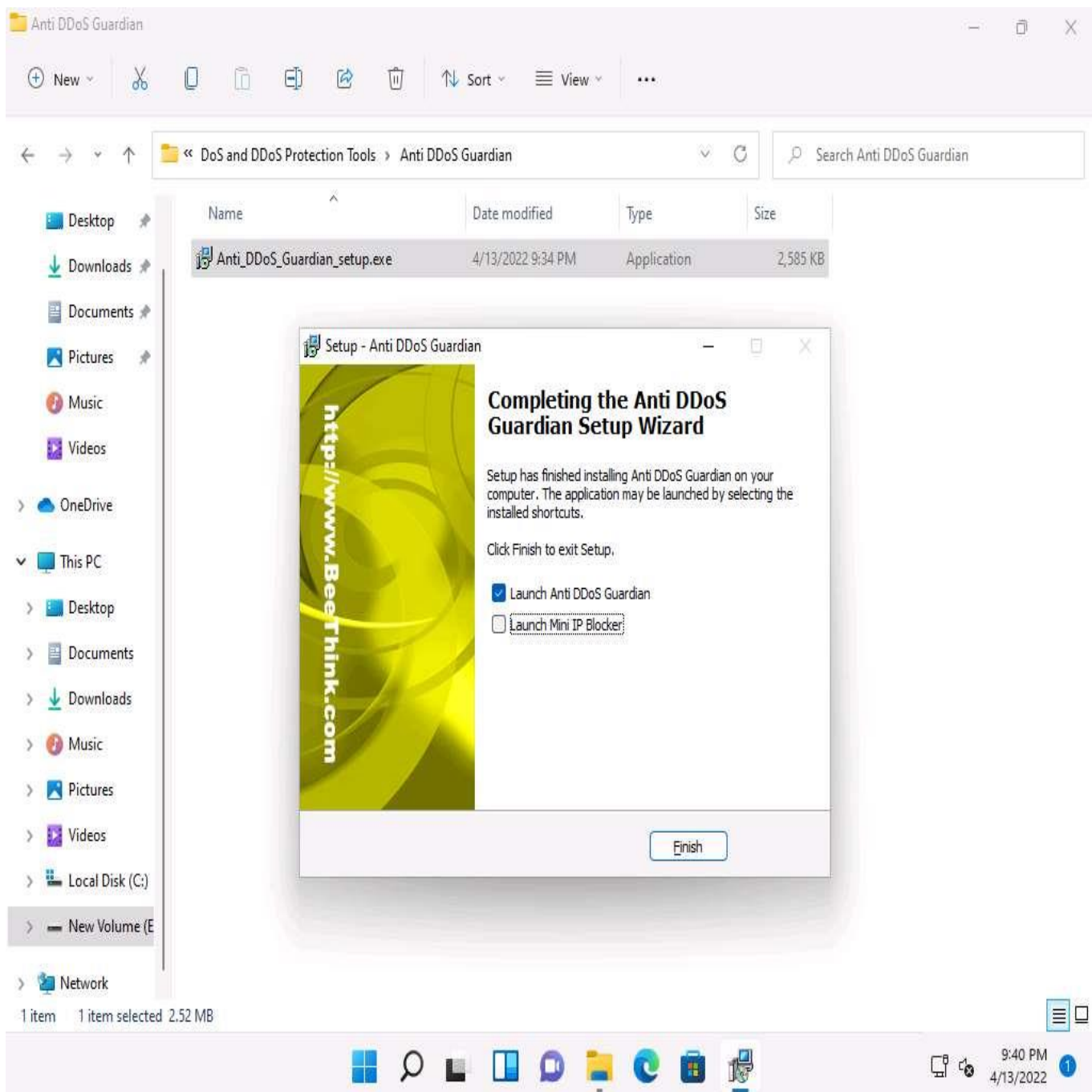
4. ☐ The **Select Additional Tasks** wizard appears; check the **Create a desktop shortcut** option, and click **Next**.



5. ☐ The **Ready to Install** wizard appears; click **Install**.



6. ☐ The **Completing the Anti DDoS Guardian Setup Wizard** window appears; uncheck the **Launch Mini IP Blocker** option and click **Finish**.



7. ☐ The **Anti-DDoS Wizard** window appears; click **Continue** in all the wizard steps, leaving all the default settings. In the last window, click **Finish**.
8. ☐ Click **Show hidden icons** from the bottom-right corner of **Desktop** and click the **Anti DDoS Guardian** icon.





9. ☐ The **Anti DDoS Guardian** window appears, displaying information about incoming and outgoing traffic, as shown in the screenshot.

Anti DDoS Guardian 5.0 is enabled

File View Tool Help

Disable Anti DDoS Record Update List Update Manager Import IP List Configure IP List Detail Clear List Stop Listing Help

Register

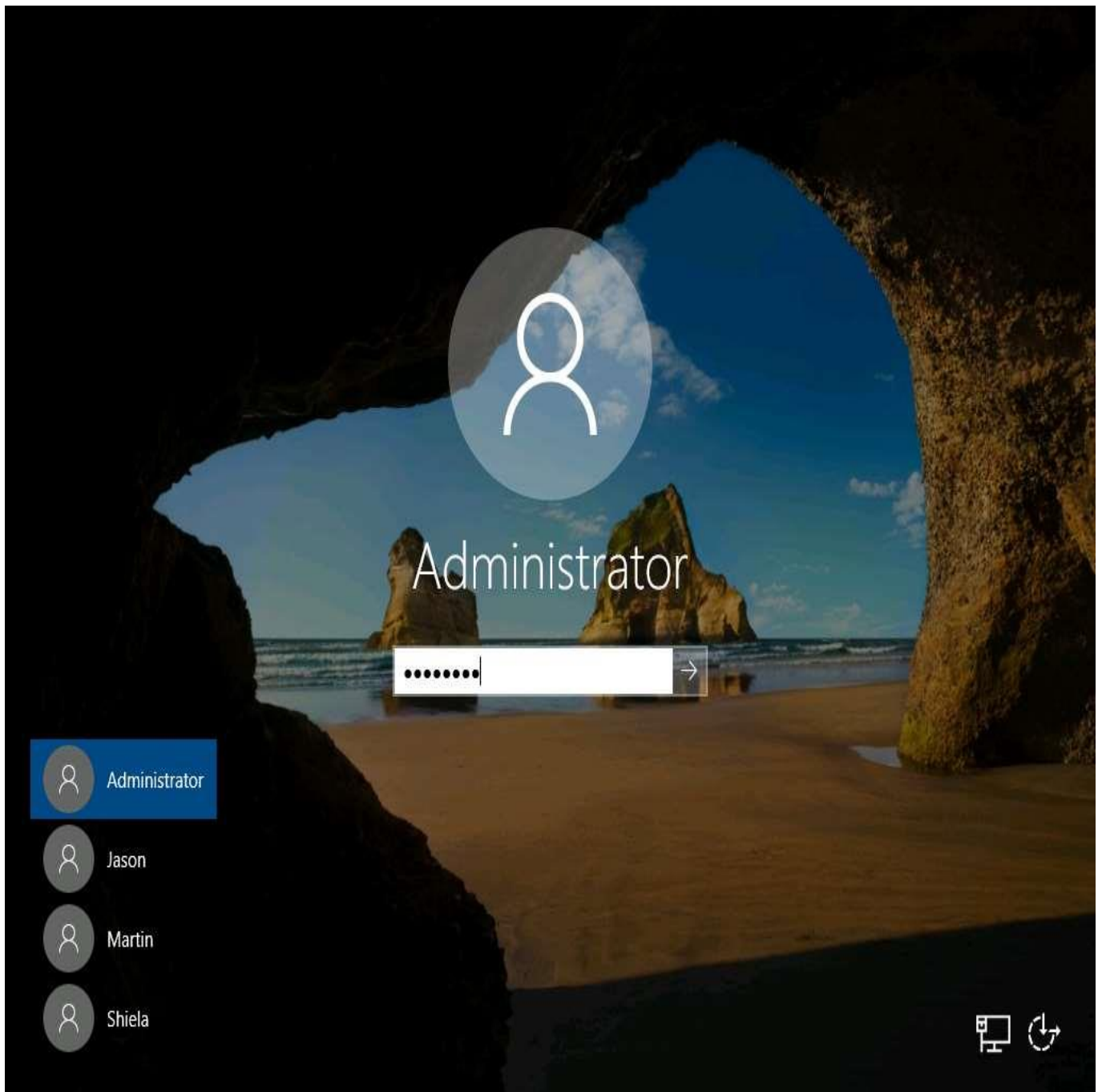
Act...	Time	Outgoing...	Incoming ...	Local IP Address	Remote IP Address	Information
●	21:40:04	3234	64856	0.0.0.0	0.0.0.0	
●	21:40:06	448	0	10.10.1.11	224.0.0.22	
●	21:40:06	376	0	10.10.1.11	224.0.0.251	
●	21:40:06	138	0	10.10.1.11	224.0.0.252	
●	21:40:06	8157	3509	10.10.1.11	8.8.8.8	Query
●	21:40:06	1123	0	10.10.1.11	10.10.1.255	
●	21:40:07	829	1638	10.10.1.11	13.107.4.52	
●	21:40:07	0	540	224.0.0.22	10.10.1.14	
●	21:40:07	5492	10344	10.10.1.11	52.226.139.121	
●	21:40:07	376	0	10.10.1.11	8.8.8.8	
●	21:40:07	5928	8700	10.10.1.11	8.8.8.8	
●	21:40:08	2564	15928	10.10.1.11	23.199.173.75	
●	21:40:08	0	14854	224.0.0.251	10.10.1.14	
●	21:40:09	1253	0	10.10.1.11	239.255.255.250	
●	21:40:09	1336	3721	10.10.1.11	51.104.162.168	
●	21:40:10	3419	10987	10.10.1.11	20.96.63.25	
●	21:41:07	0	243	10.10.1.255	10.10.1.19	
●	21:41:51	330	0	10.10.1.11	10.10.1.2	
●	21:41:54	0	54	10.10.1.11	204.79.197.203	
●	21:42:48	0	243	10.10.1.255	10.10.1.22	

Block unwanted network traffic

NUM

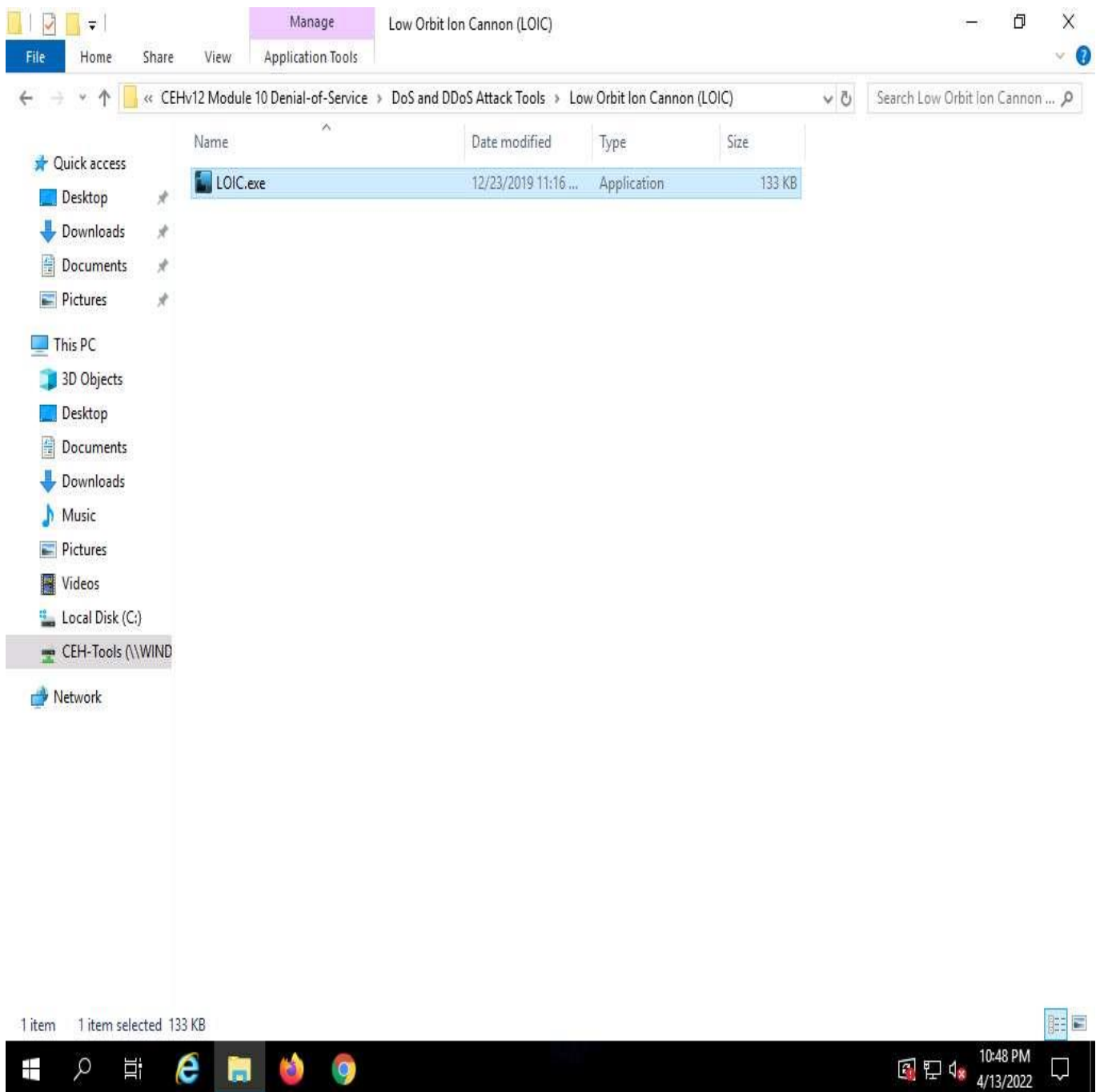
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10. ☐ Now, click [Windows Server 2019](#) to switch to the **Windows Server 2019** and click [Ctrl+Alt+Delete](#) to activate the machine. By default, **Administrator** profile is selected, click **Pa\$\$w0rd** to enter the password and press **Enter** to log in.

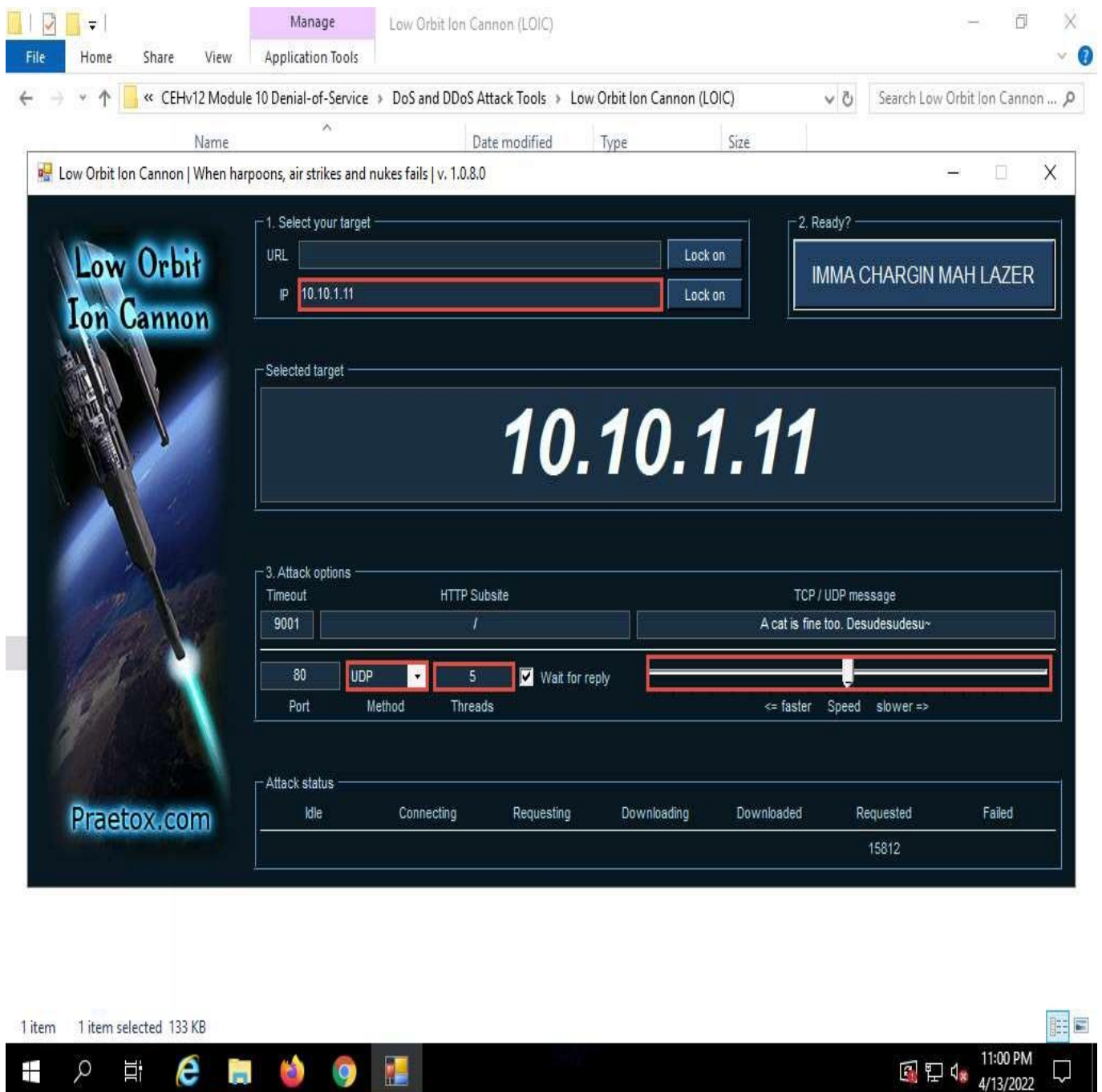


11. ☐ Navigate to **Z:\CEH-Tools\CEHv12 Module 10 Denial-of-Service\DoS and DDoS Attack Tools\Low Orbit Ion Cannon (LOIC)** and double-click **LOIC.exe**.

If an **Open File - Security Warning** pop-up appears, click **Run**.



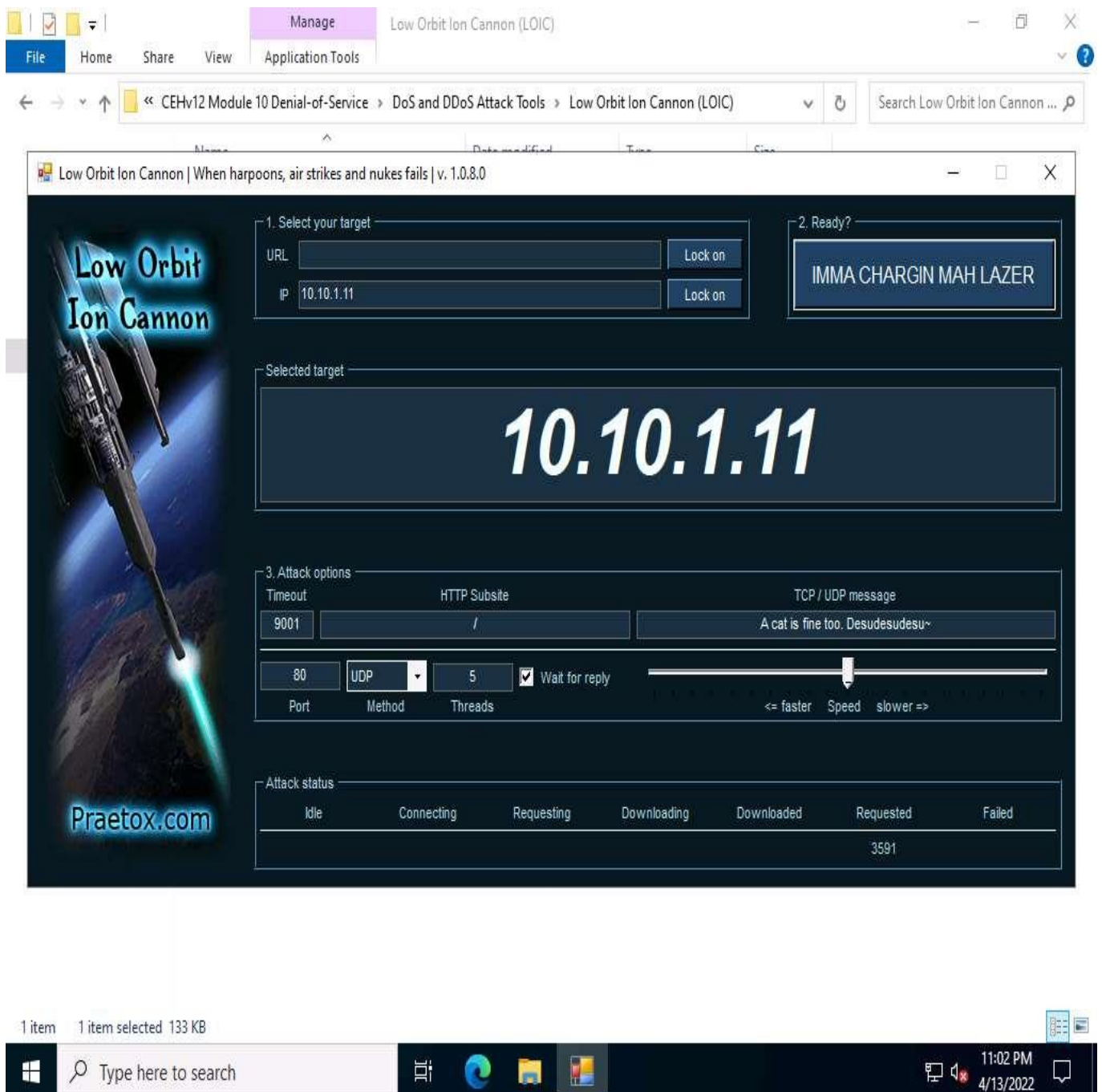
12. ☐ The **Low Orbit Ion Cannon** main window appears.
13. ☐ Perform the following settings:
 - Under the **Select your target** section, type the target IP address under the **IP** field (here, **10.10.1.11**), and then click the **Lock on** button to add the target devices.
 - Under the **Attack options** section, select **UDP** from the drop-down list in **Method**. Set the thread's value to **5** under the **Threads** field. Slide the power bar to the middle.



14. ☐ Now, switch to the **Windows Server 2022** machine and follow **Steps 11 - 13** to launch LOIC and configure it.

To switch to the **Windows Server 2022**, click [Windows Server 2022](#).

15. ☐ Once **LOIC** is configured on all machines, switch to each machine (**Windows Server 2019**, and **Windows Server 2022**) and click the **IMMA CHARGIN MAH LAZER** button under the **Ready?** section to initiate the DDoS attack on the target **Windows 11** machine.



16. ☐ Click [Windows 11](#) to switch back to the **Windows 11** machine and observe the packets captured by **Anti DDoS Guardian**.
17. ☐ Observe the huge number of packets coming from the host machines (**10.10.1.19 [Windows Server 2019]** and **10.10.1.22 [Windows Server 2022]**).

Anti DDoS Guardian 5.0 is enabled

File View Tool Help

Disable Anti DDoS Record Update List Update Manager Import IP List Configure IP List Detail Clear List Stop Listing Help

Register

Act...	Time	Outgoing...	Incoming ...	Local IP Address	Remote IP Address	Information
●	22:55:54	880	0	10.10.1.11	10.10.1.255	
●	22:55:54	829	1638	10.10.1.11	13.107.4.52	
●	22:55:54	5675	10620	10.10.1.11	52.226.139.121	
●	22:55:55	54	205	10.10.1.11	52.226.139.185	
●	22:55:55	1832	3188	10.10.1.11	72.21.91.29	
●	22:55:55	2888	16347	10.10.1.11	184.30.254.53	
●	22:55:56	3353	7521	10.10.1.11	20.191.46.211	
●	22:55:57	1611	0	10.10.1.11	239.255.255.250	
●	22:55:57	1194	1661	10.10.1.11	10.10.1.22	
●	22:55:58	0	75	224.0.0.251	10.10.1.22	
●	22:55:58	94	8539008	10.10.1.11	10.10.1.22	
●	22:56:12	0	864	224.0.0.22	10.10.1.14	
●	22:56:12	0	23034	224.0.0.251	10.10.1.14	
●	22:56:16	0	75	224.0.0.251	10.10.1.19	
●	22:56:17	17742	32114	10.10.1.11	20.50.80.209	Access onedscolprdneu02.northeurope.cloudapp.azure.com
●	22:56:17	2680	17806	10.10.1.11	52.113.194.132	
●	22:56:26	54	54	10.10.1.11	209.197.3.8	
●	22:56:28	0	54	10.10.1.11	51.104.167.186	
●	22:56:32	19788	0	10.10.1.11	10.10.1.22	
●	22:56:35	0	54	10.10.1.11	20.54.24.231	
●	22:56:38	0	8541080	10.10.1.11	10.10.1.19	
●	22:56:38	19176	0	10.10.1.11	10.10.1.19	
●	22:57:00	0	54	10.10.1.11	131.253.33.200	
●	22:57:00	0	54	10.10.1.11	13.107.5.88	
●	22:57:21	0	54	10.10.1.11	52.184.215.140	
●	22:57:58	75	0	10.10.1.11	224.0.0.251	
●	22:58:30	23296	28506	10.10.1.11	52.249.36.203	Access fe2cr.update.msft.com.trafficmanager.net
●	22:58:31	6015	18812	10.10.1.11	40.126.28.20	Access www.tm.a.prd.aadg.trafficmanager.net
●	22:58:31	8912	16236	10.10.1.11	20.189.173.7	Access onedscolprdwus06.westus.cloudapp.azure.com
●	22:58:31	15629	5624	10.10.1.11	52.152.108.96	Access glb.cws.prod.dcat.dsp.trafficmanager.net
●	23:00:19	16515	5523	10.10.1.11	13.89.178.27	Access onedscolprdcus03.centralus.cloudapp.azure.com
●	23:00:55	330	0	10.10.1.11	10.10.1.2	
●	23:02:48	54	139	10.10.1.11	23.199.172.121	

Block unwanted network traffic

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18. ☐ Double-click any of the sessions **10.10.1.19** or **10.10.1.22**.

Here, we have selected 10.10.1.22. You can select either of them.

19. ☐ The **Anti DDoS Guardian Traffic Detail Viewer** window appears, displaying the content of the selected session in the form of raw data. You can observe the high number of incoming bytes from **Remote IP address 10.10.1.22**, as shown in the screenshot.
20. ☐ You can use various options from the left-hand pane such as **Clear**, **Stop Listing**, **Block IP**, and **Allow IP**. Using the Block IP option blocks the IP address sending the huge number of packets.
21. ☐ In the **Traffic Detail Viewer** window, click **Block IP** option from the left pane.

Anti DDoS Guardian
 Traffic Detail Viewer

Display the content of each session in the form of raw data.
 Note: Not all packets will be showed for the reason of display speed.

Clear(C)

Stop Listing(L)

Block IP(B)

Allow IP(A)

Save(S)...

Close(Q)

Help(H)

Local IP address: 10.10.1.11 Remote IP address: 10.10.1.22

Outgoing bytes: 94 Incoming bytes: 8857134

Action:

```

A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63979, Destination port: 80
A cat is fine too. Desudesudesu~
Skipped 33 packets
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63981, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63981, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63981, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63982, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63982, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63982, Destination port: 80
A cat is fine too. Desudesudesu~
23:03:54 An incoming packet(Allowed) Protocol: UDP, Source port: 63982, Destination port: 80
A cat is fine too. Desudesudesu~

```

Act...	Time	Outgoing...			
●	22:55:54	880			
●	22:55:54	829			
●	22:55:54	5675			
●	22:55:55	54			
●	22:55:55	1832			
●	22:55:55	2888			
●	22:55:56	3461			
●	22:55:57	1611			
●	22:55:57	1194			
●	22:55:58	0			
●	22:55:58	94			
●	22:56:12	0			
●	22:56:12	0			
●	22:56:16	0			
●	22:56:17	17742			
●	22:56:17	2680			
●	22:56:26	54			
●	22:56:28	0			
●	22:56:32	20808			
●	22:56:35	0			
●	22:56:38	0			
●	22:56:38	20400			
●	22:57:00	0			
●	22:57:00	0			
●	22:57:21	0			
●	22:57:58	75			
●	22:58:30	23296			
●	22:58:31	6015			
●	22:58:31	8912			
●	22:58:31	15629	5624	10.10.1.11	52.152.108.96 Access glb.cws.prod.dcat.dsp.trafficmanager.net
●	23:00:19	16515	5523	10.10.1.11	13.89.178.27 Access onedscolprdcus03.centralus.cloudapp.azure.com
●	23:00:55	330	0	10.10.1.11	10.10.1.2
●	23:02:48	54	139	10.10.1.11	23.199.172.121

Block unwanted network traffic

NUM

22. ☐ Observe that the blocked IP session turns red in the **Action Taken** column.

Anti DDoS Guardian 5.0 is enabled

File View Tool Help

Disable Anti DDoS Record Update List Update Manager Import IP List Configure IP List Detail Clear List Stop Listing Help

Register

Act...	Time	Outgoing...	Incoming ...	Local IP Address	Remote IP Address	Information
●	22:55:54	1123	0	10.10.1.11	10.10.1.255	
●	22:55:54	829	1638	10.10.1.11	13.107.4.52	
●	22:55:54	5882	10843	10.10.1.11	52.226.139.121	
●	22:55:55	54	205	10.10.1.11	52.226.139.185	
●	22:55:55	1832	3188	10.10.1.11	72.21.91.29	
●	22:55:55	2888	16347	10.10.1.11	184.30.254.53	
●	22:55:56	3461	7575	10.10.1.11	20.191.46.211	
●	22:55:57	1611	0	10.10.1.11	239.255.255.250	
●	22:55:57	1194	1661	10.10.1.11	10.10.1.22	
●	22:55:58	0	75	224.0.0.251	10.10.1.22	
●	22:55:58	94	1107898...	10.10.1.11	10.10.1.22	
●	22:56:12	0	1080	224.0.0.22	10.10.1.14	
●	22:56:12	0	29106	224.0.0.251	10.10.1.14	
●	22:56:16	0	75	224.0.0.251	10.10.1.19	
●	22:56:17	17742	32114	10.10.1.11	20.50.80.209	Access onedscolprdneu02.northeurope.cloudapp.azure.com
●	22:56:17	2680	17806	10.10.1.11	52.113.194.132	
●	22:56:26	54	54	10.10.1.11	209.197.3.8	
●	22:56:28	0	54	10.10.1.11	51.104.167.186	
●	22:56:32	26826	0	10.10.1.11	10.10.1.22	
●	22:56:35	0	54	10.10.1.11	20.54.24.231	
●	22:56:38	0	11283002	10.10.1.11	10.10.1.19	
●	22:56:38	31110	0	10.10.1.11	10.10.1.19	
●	22:57:00	0	54	10.10.1.11	131.253.33.200	
●	22:57:00	0	54	10.10.1.11	13.107.5.88	
●	22:57:21	0	54	10.10.1.11	52.184.215.140	
●	22:57:58	75	0	10.10.1.11	224.0.0.251	
●	22:58:30	23296	28506	10.10.1.11	52.249.36.203	Access fe2cr.update.msft.com.trafficmanager.net
●	22:58:31	6015	18812	10.10.1.11	40.126.28.20	Access www.tm.a.pr.d.aadg.trafficmanager.net
●	22:58:31	8912	16236	10.10.1.11	20.189.173.7	Access onedscolprdwus06.westus.cloudapp.azure.com
●	22:58:31	15629	5624	10.10.1.11	52.152.108.96	Access glb.cws.prod.dcat.dsp.trafficmanager.net
●	23:00:19	16515	5523	10.10.1.11	13.89.178.27	Access onedscolprdcus03.centralus.cloudapp.azure.com
●	23:00:55	330	0	10.10.1.11	10.10.1.2	
●	23:02:48	54	139	10.10.1.11	23.199.172.121	
●	23:04:59	0	243	10.10.1.255	10.10.1.19	

Block unwanted network traffic

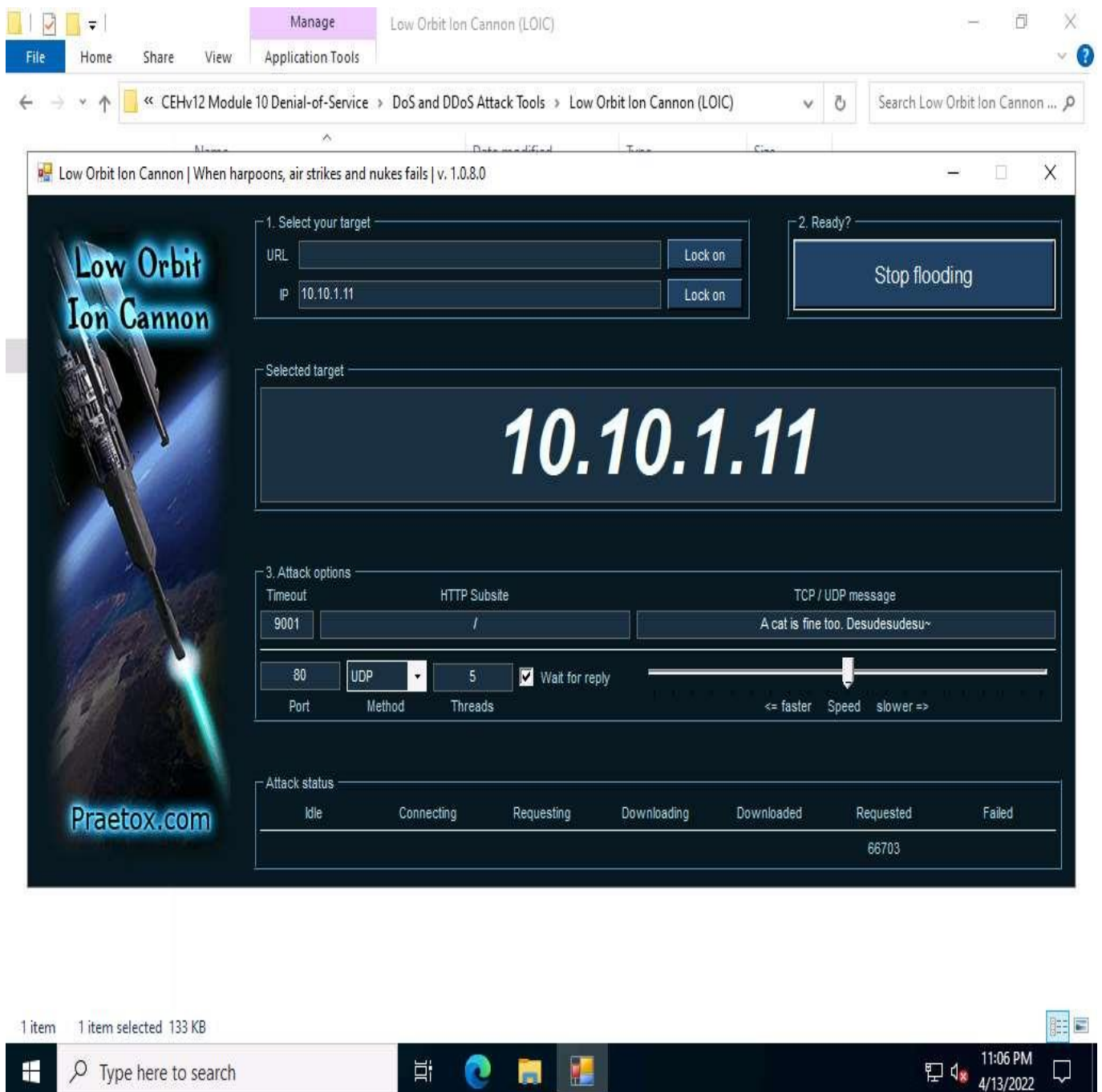
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23. ☐ Similarly, you can **Block IP** the address of the **10.10.1.19** session.
24. ☐ On completion of the task, click **Stop flooding**, and then close the LOIC window on all the attacker machines. (**Windows Server 2019** and **Windows Server 2022**).

To switch to the **Windows Server 2019**, click [Windows Server 2019](#).

To switch to the **Windows Server 2022**, click [Windows Server 2022](#).



25. ☐ This concludes the demonstration of how to detect and protect against a DDoS attack using Anti DDoS Guardian.
26. ☐ Close all open windows and document all the acquired information.
27. ☐ You can also use other DoS and DDoS protection tools such as, **DOSarrest's DDoS protection service** (<https://www.dosarrest.com>), **DDoS-GUARD** (<https://ddos-guard.net>), and **Cloudflare** (<https://www.cloudflare.com>) to protect organization's systems and networks from DoS and DDoS attacks.
28. ☐ Click [Windows 11](#) to switch to the Windows 11 virtual machine. In **Windows 11** machine, navigate to **Control Panel --> Programs --> Programs and Features** and uninstall **Anti DDoS Guardian**.