Fortinet Cybersecurity Academy: Configuring an SSL Remote Access VPN on a FortiGate 40-F Firewall

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FORTINET

Purpose

This lab is intended to show off the intricate VPN capabilities of the FortiGate-40F firewall by showing off an SSL VPN connection, which is a common type of connection used to provide secure outside access to an internal SOHO network. The lab employs the use of Microsoft's Remote Desktop Protocol (RDP) to show off a common use of an SSL VPN on a SOHO network.

Background

SOHO, short for Small Office/Home Office, is a network type commonly used by individuals or small businesses with less than 10 employees. This network type commonly uses smaller-scale routers, switches, and firewalls compared to their large enterprise counterparts. SOHO networks provide numerous advantages to teams of 1-10 people as they are easier to set up and are more affordable than full-size network equipment. SOHO networks often only have a single router, and may contain switches, wireless access points, and end devices such as computers and printers.

Fortinet is a cybersecurity company founded in 2000 in Sunnyvale, CA. They are known for their flagship product, the FortiGate firewall, as well as a wide variety of other networking and security devices, such as the FortiSwitch and the FortiAP, and services such as FortiSandbox, FortiAuthenticator, FortiVoice, and FortiDDoS. Fortigate is an S&P 500 component and is listed on the NASDAQ as $FTNT.

The FortiGate 40-F is a firewall developed by Fortinet. It has capabilities expected of a modern firewall such as full routing capability, DHCP server capability, and support for a variety of filtering methods. The 40-F also supports running its own local RADIUS server with a feature called Local Auth (Authentication). The 40-F uses a fanless design, allowing it to operate silently. The 40-F has a small form factor at 1.5 x 8.5 x 6.3 inches, meaning it can easily fit into existing networking setups. By default, the 40-F gives out DHCP addresses in the 192.168.1.0/24 subnet to its clients (from .110-.210, specifically) and its GUI client can be accessed via HTTPS at 192.168.1.99.

Secure Socket Layer, or SSL, is a security protocol developed by Netscape Communications in 1994 that provides security to network connections. The protocol is now deprecated and replaced with Transport Layer Security, or TLS, a protocol developed by the Internet Engineering Task Force (IETF) in 1999. Both protocols are very similar and are often used interchangeably in the networking world. SSL/TLS's most common use case is for the HTTPS (Hypertext Transfer Protocol Secure) protocol, which provides security to HTTP connections over the Internet.

A virtual private network, or a VPN, is a method of creating a secure tunnel between networks. VPNs allow computers that are physically located offsite to be treated the same as computers physically inside of a network. There are two primary types of VPNs: remote access (RAVPN) and site-to-site, which create private tunnels for individual computers and entire networks respectively. In the business world, VPNs are often used to allow employees working from home to access company resources

located on internal servers. VPN services are commonly sold commercially, allowing consumers to connect to private network-sharing servers. These servers are often located in multiple countires or regions, enabling consumers to spoof their location and hide network traffic from their ISP.

Remote Desktop Protocol, or RDP, is a Microsoft-proprietary protocol that allows a user to remotely view and control a connected Windows PC. RDP employs a client/server model, with the client being included on all versions of Windows and the server being exclusive to the operating system's higher tiers. RDP uses port 3389 with both TCP and UDP. RDP was introduced during Microsoft's transition from MS-DOS to the NT kernel with Windows NT 4.0 Terminal Services Edition, and the server has been included on every version of Windows (other than Home) since XP.

FortiClient is a Fortinet Fabric Agent, which is a program that runs on an external host device and provides secure communication with the Fortinet Security Fabric. The full version of FortiClient provides a wide variety of security services, such as Zero Trust Network Access (ZTNA), content filtering, cloud-based application security, and telemetry information. FortiClient also offers a lighter VPN-only version for users that don't need advanced security services.

Lab Summary

In this lab, we created an SSL VPN connection to allow connections from the internet into computers on the internal network. The firewall assigns IP addresses from 192.168.2.1-192.168.2.254 to VPN clients internally and allows traffic from the VPN interface to reach both the LAN and WAN interfaces. We created a test VPN user to allow secure authentication into the network and used a remote desktop connection to a computer on the internal network to test the VPN connection.

Lab Commands

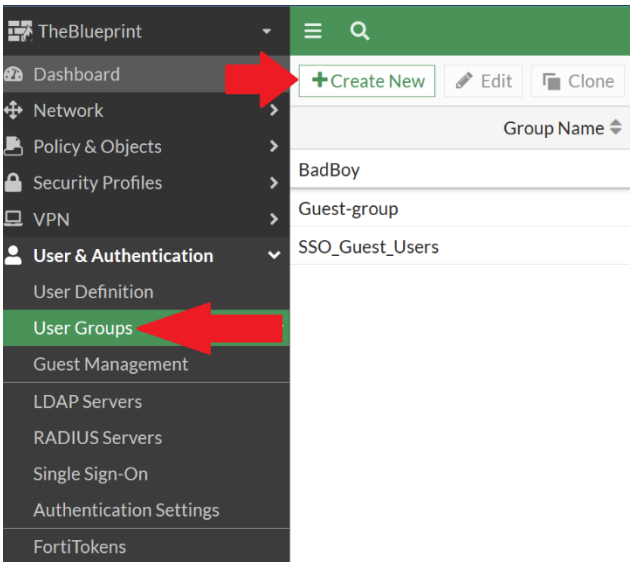
From the dashboard, open the command-line interface.

Type the following commands:

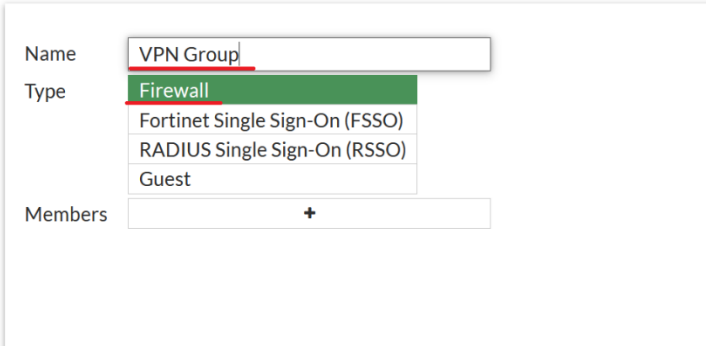
```
config system settings
    set gui-sslvpn enable
end
```

Reload the page.

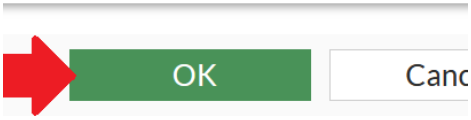
Go to User & Authentication > User Groups and click Create New.



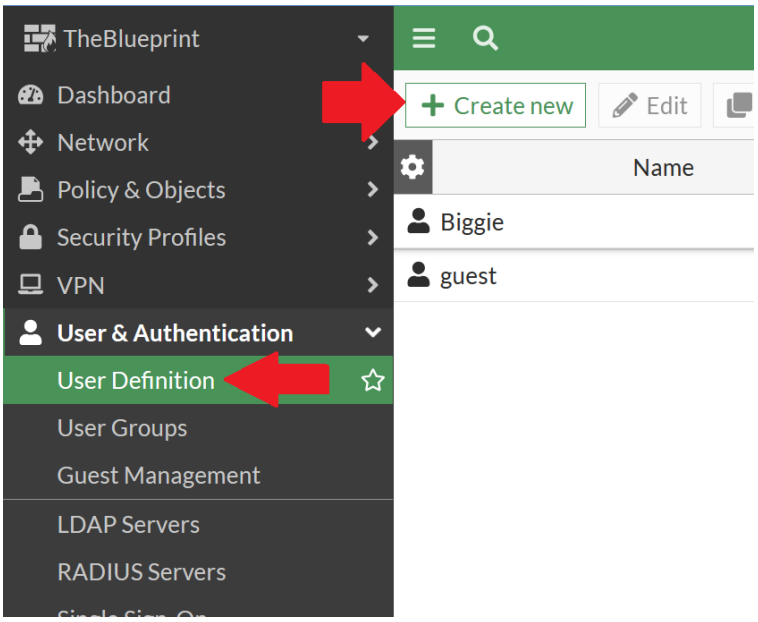
Name the group and set the type to Firewall.



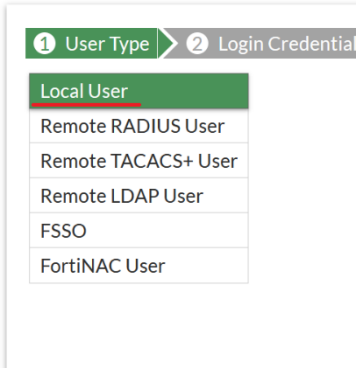
Click OK.



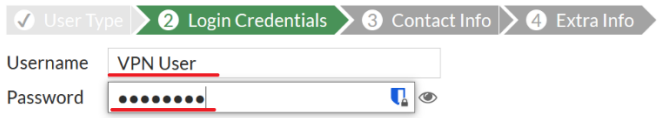
Go to User & Authentication > User Definition and click Create New.



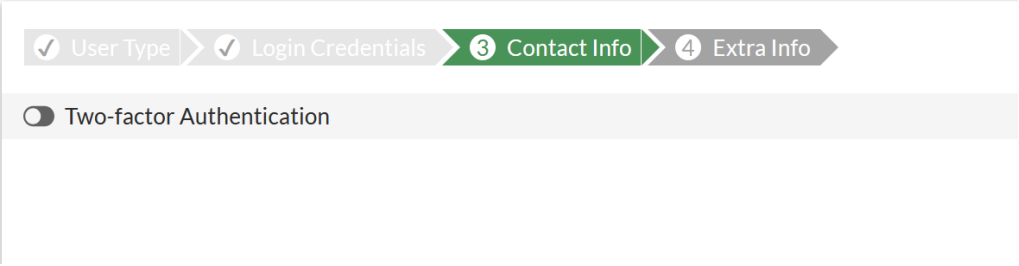
Select Local User and click Next.



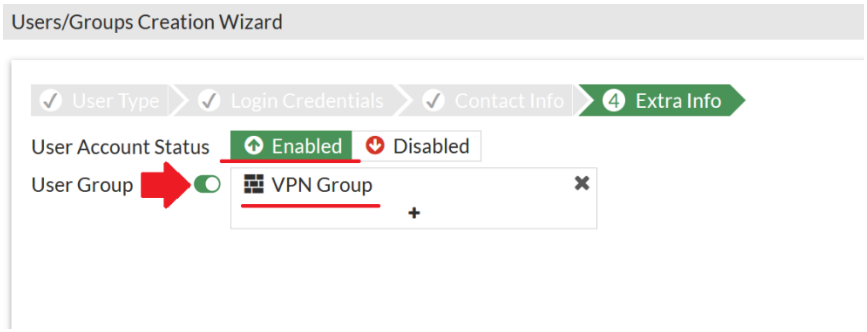
Enter an appropriate username and password for your VPN user, then click Next.



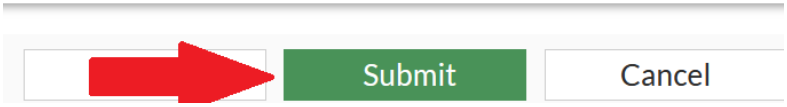
Turn on two-factor authentication if desired and click Next.



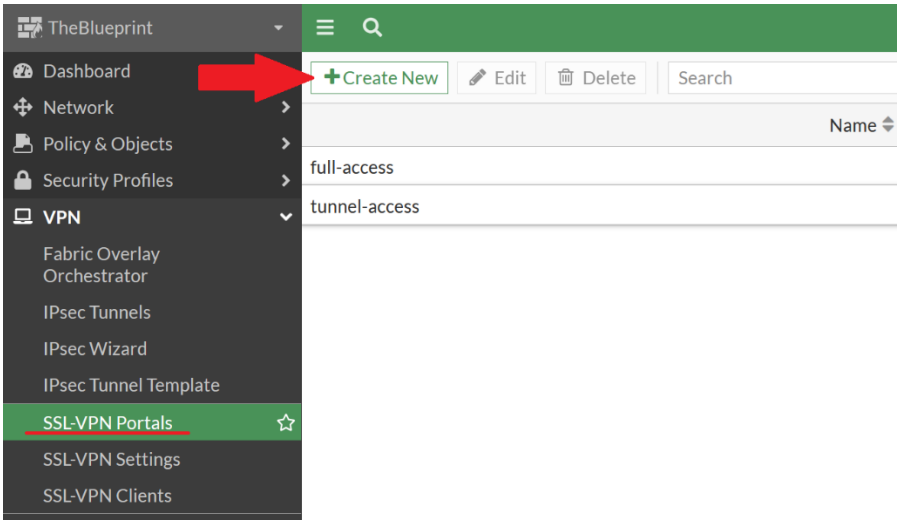
Ensure the account is enabled, enable the user group, and select the group you created earlier.



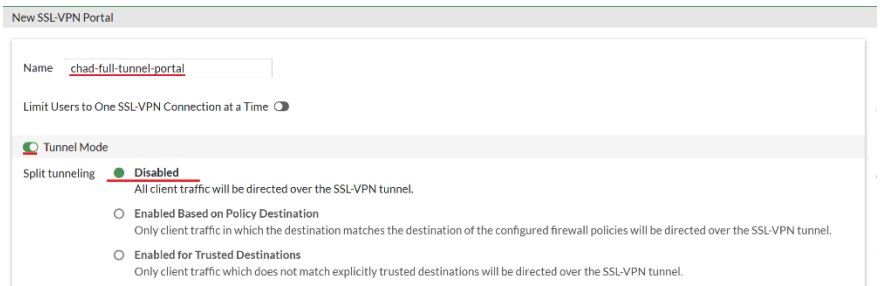
Click Submit.



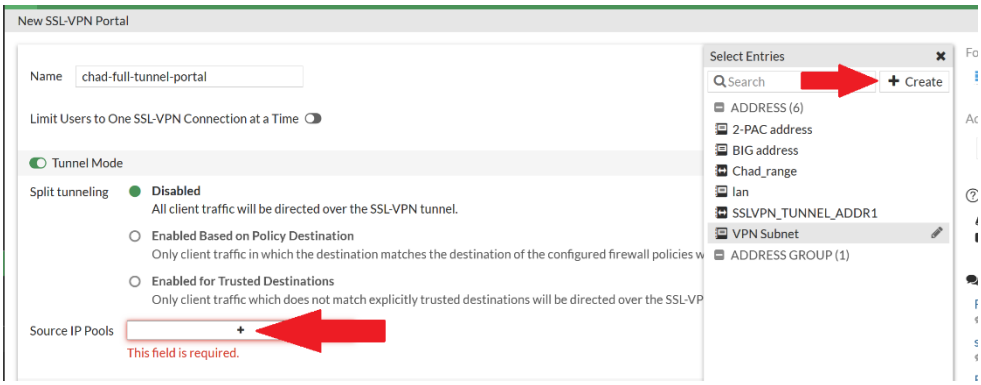
Go to VPN > SSL-VPN Portals and click Create New.



Name the VPN portal, turn on tunnel mode, and disable split tunneling.

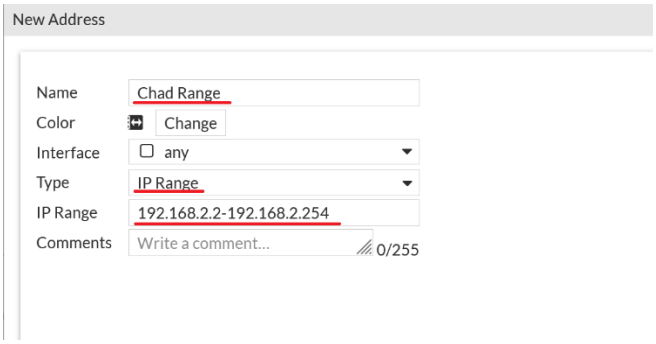


Click on Source IP Pools and click Create.

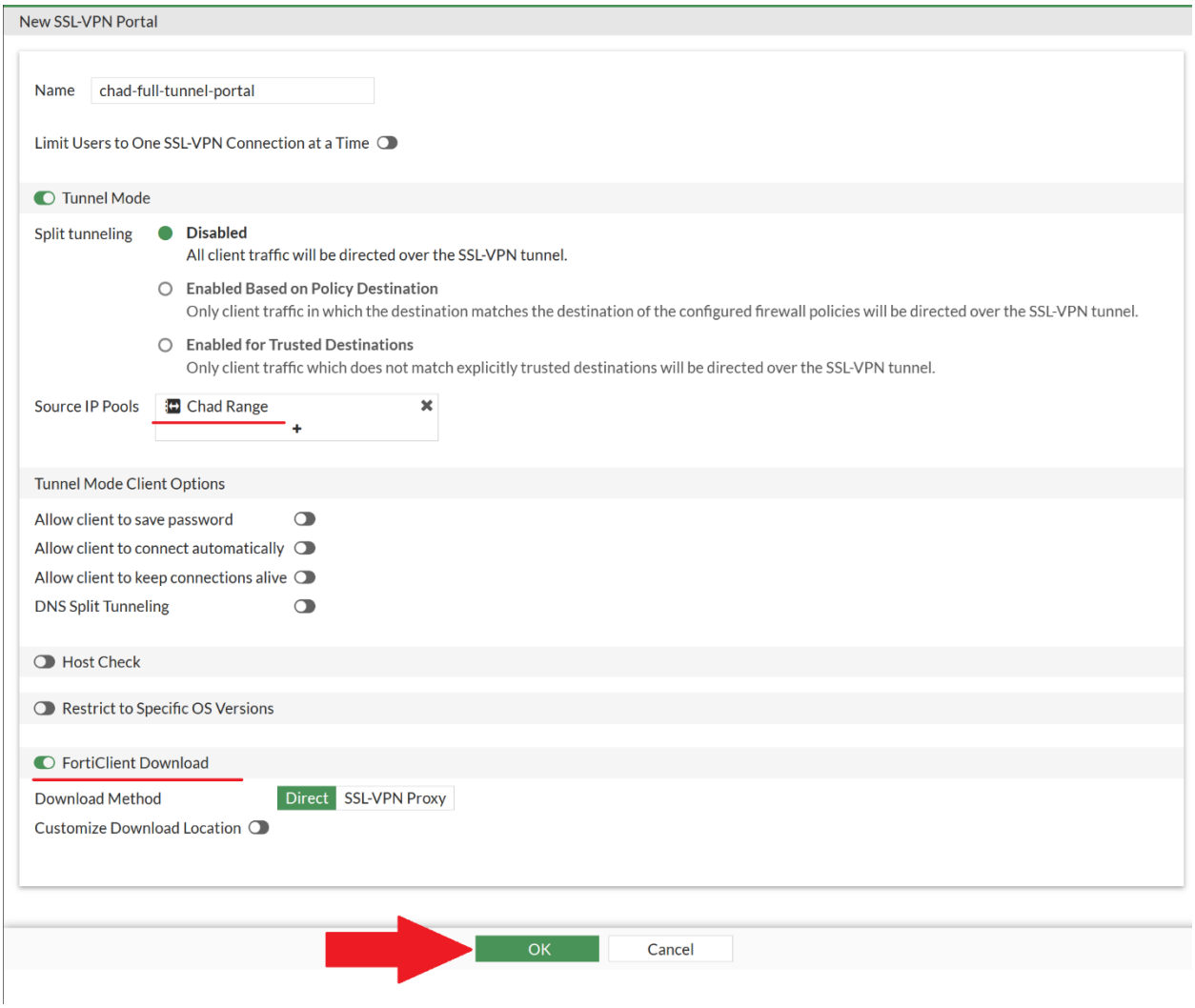


Click Address.

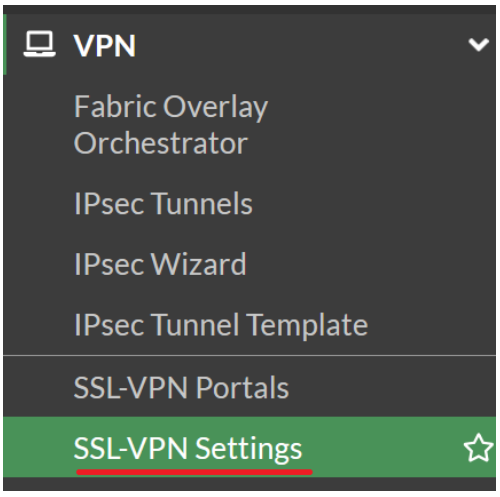
Name the range, set the type to IP range, and configure an appropriate range of IP addresses for VPN clients.



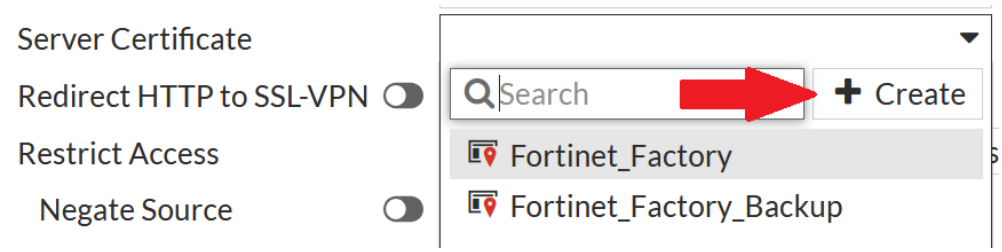
Ensure the range you created is selected, turn on FortiClient Download, then click OK.



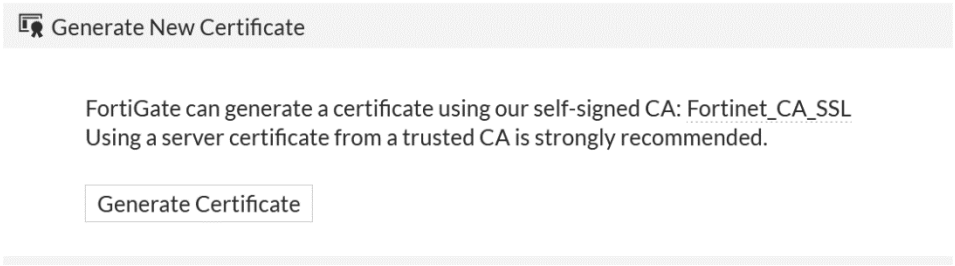
Go to VPN > SSL-VPN Settings.



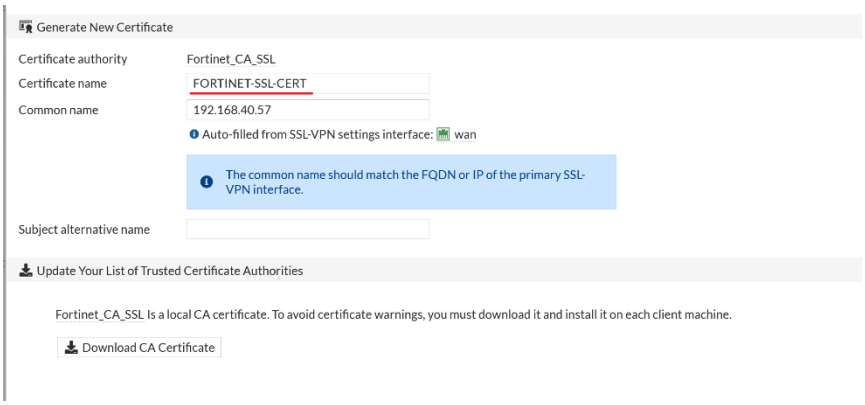
Under server certificate, click create.

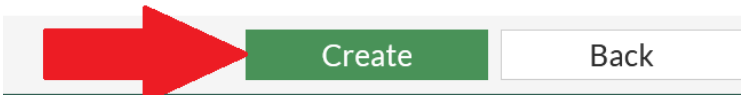


Click Generate Certificate.

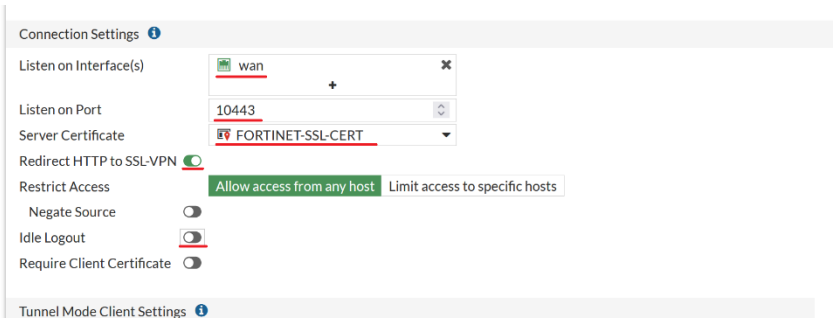


Name the certificate accordingly and click Create.

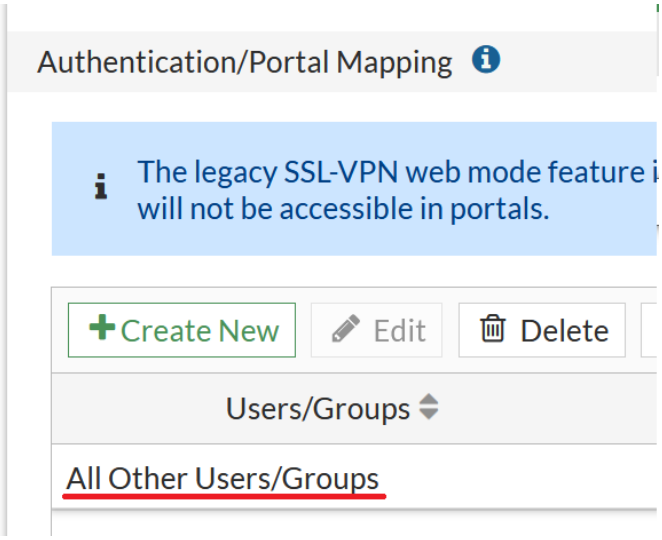




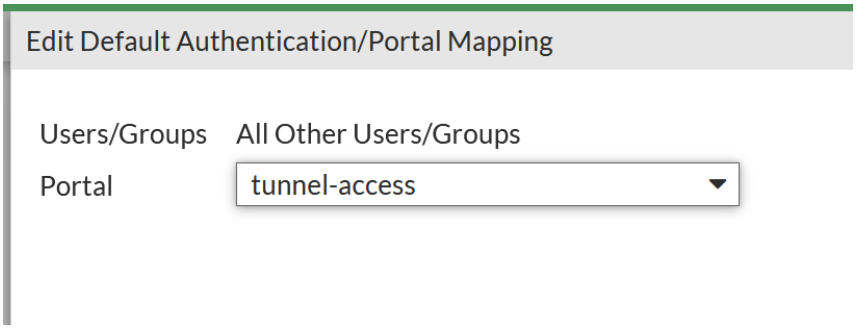
Ensure the VPN is listening on the WAN interface on port 10443 using the certificate you created. Turn on Redirect HTTP to SSL-VPN and turn off Idle Logout.



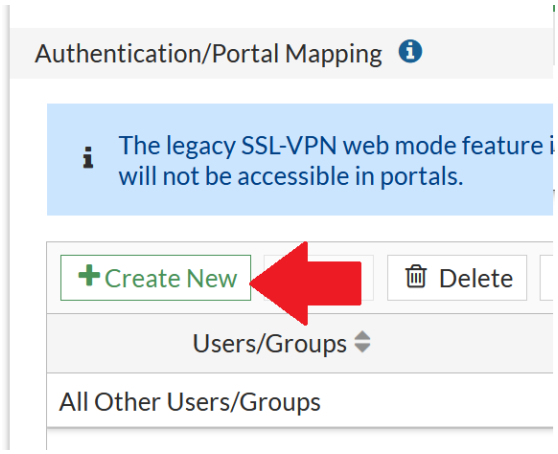
Under Authentication/Portal Mapping, click on All Other Users/Groups.



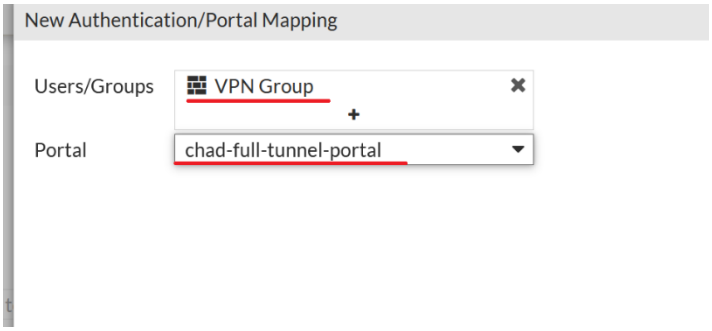
Set the portal to tunnel-access.



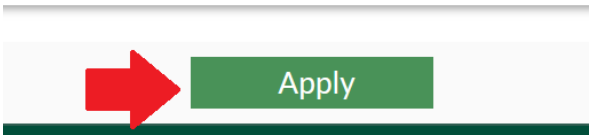
Click Create New.



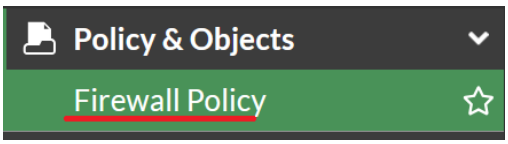
Set the group to the VPN group you created and set the portal to the tunnel you created.



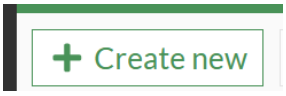
Click Apply.



Go to Policy & Objects > Firewall Policy.

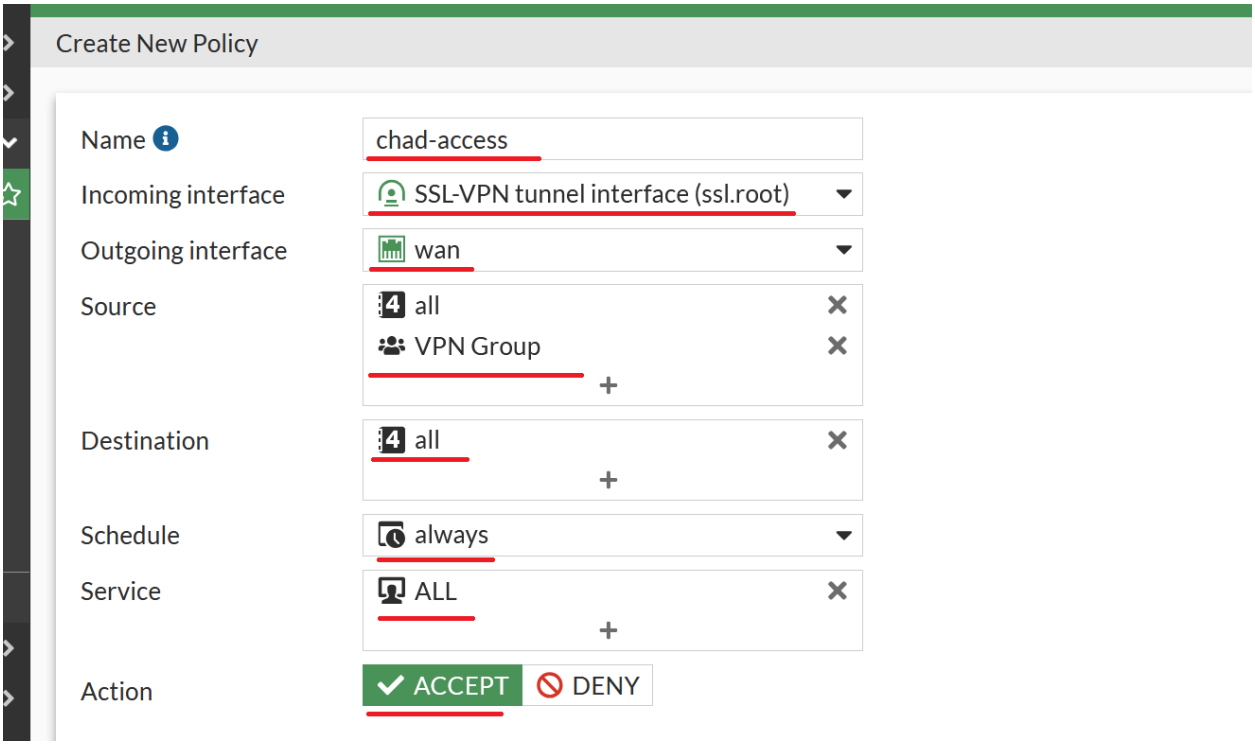


Click Create New.

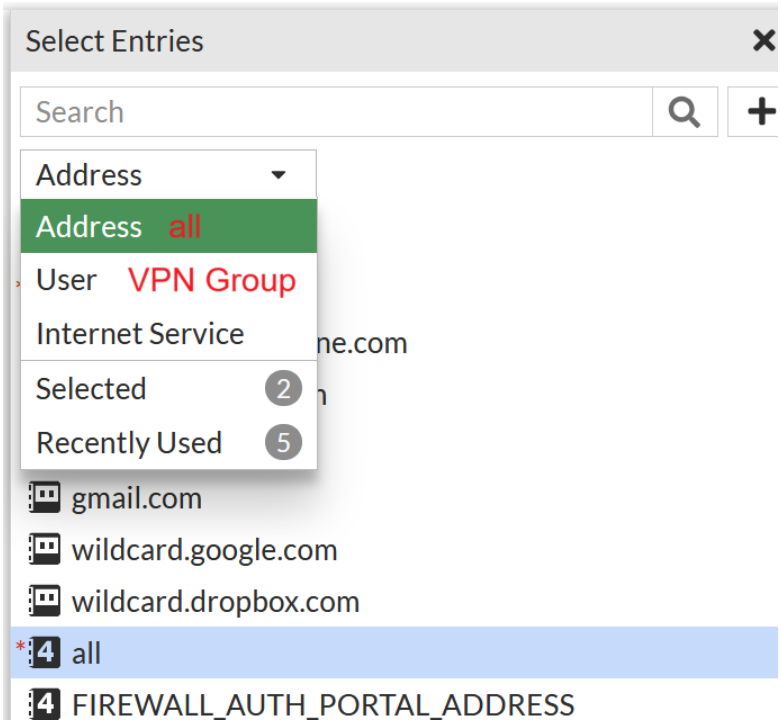


Give the policy an appropriate name, set the incoming interface to the SSL-VPN tunnel interface, the outgoing interface to LAN, the source address to all, the source user

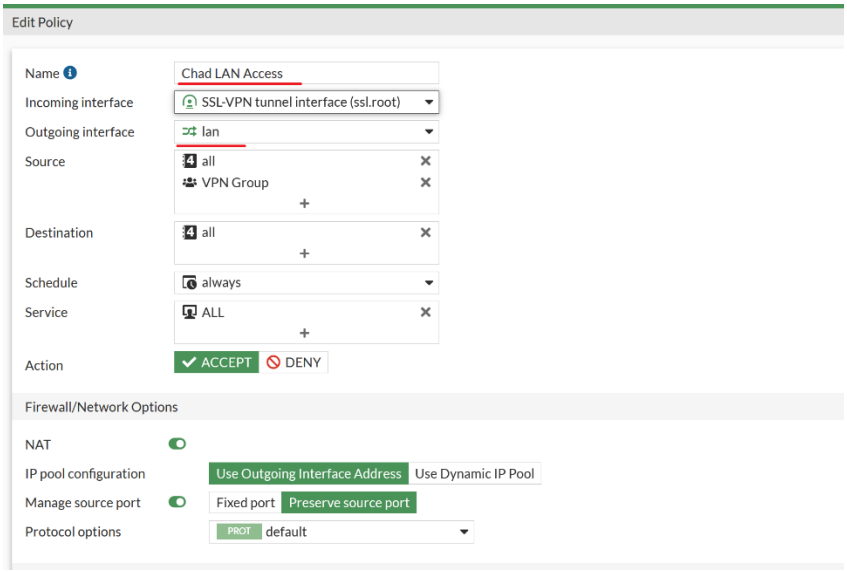
group to the VPN group, the destination to all, the schedule to always, the service to all, and the action to accept.



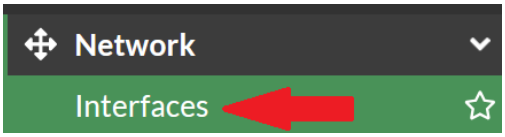
(Note: for the source, you will have to select options from two different columns using the dropdown at the top. Select all from the Address column and VPN Group from the User column.)



Create another firewall policy that's identical except for the outgoing interface being the LAN interface.

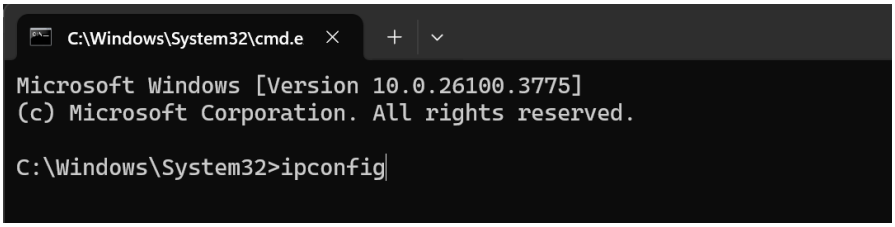


Go to Network > Interfaces.

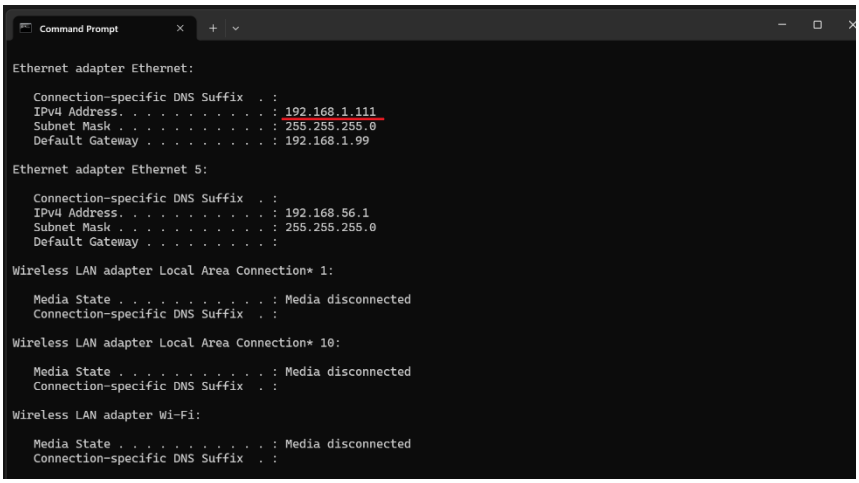


Note down the IP address of the WAN interface. You will need this later.

On your inside PC, open command prompt and run the command `ipconfig`.

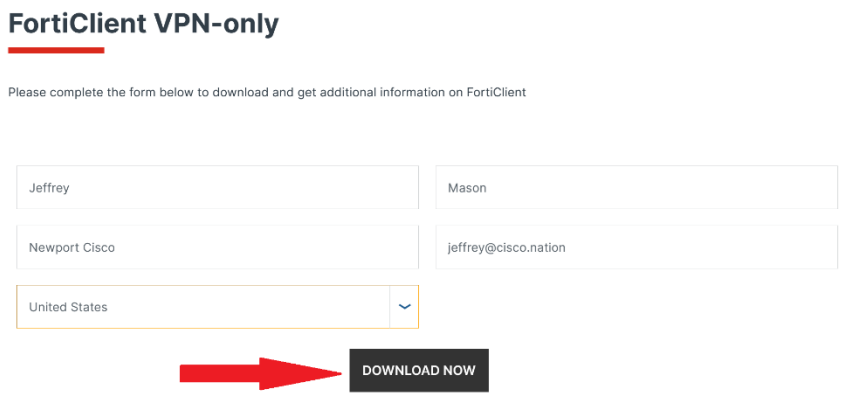


Note down the IP address; you will need this later.



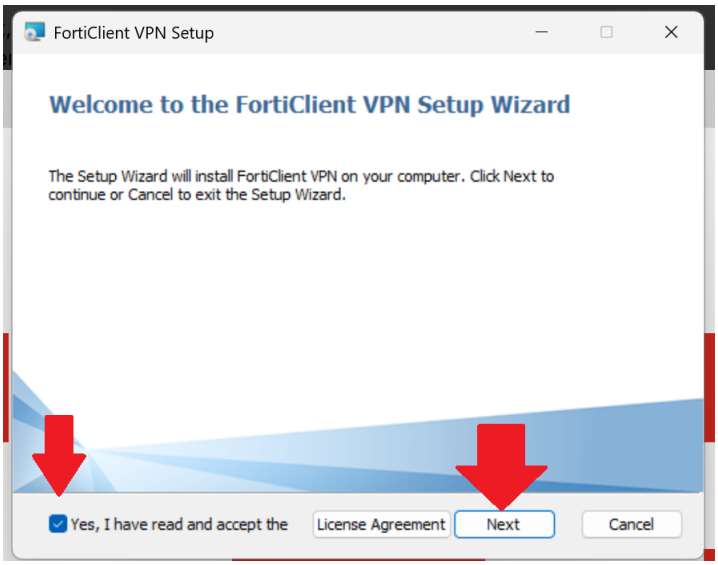
On your outside PC, download the FortiClient VPN-only client from https://www.fortinet.com/support/product-downloads.

You may have to enter some personal information to download the client. Click Download Now to download.

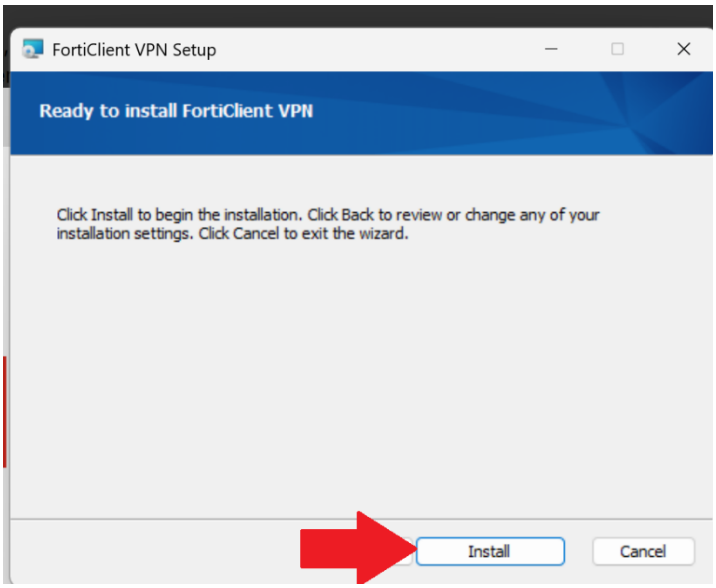


Click the downloaded .exe file.

Read and accept the license agreement, then click Next.

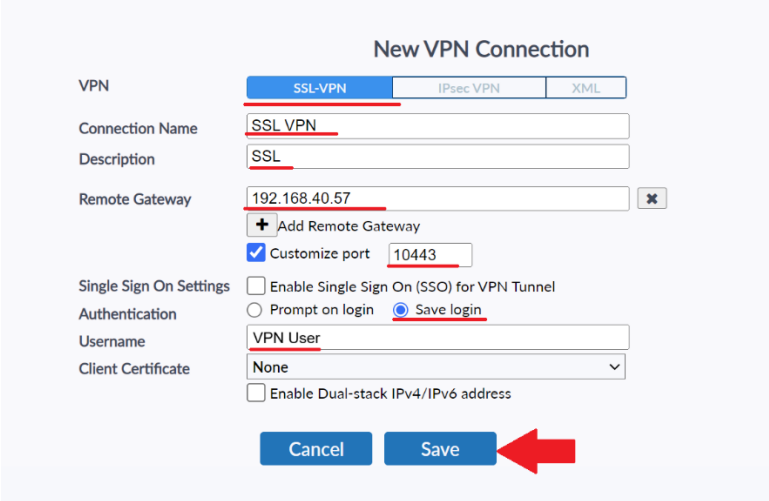


Click Install.

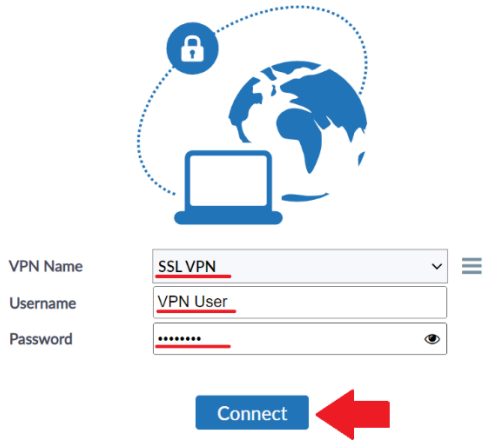


Open the FortiClient window and click on the hamburger menu. Click Add a new connection.

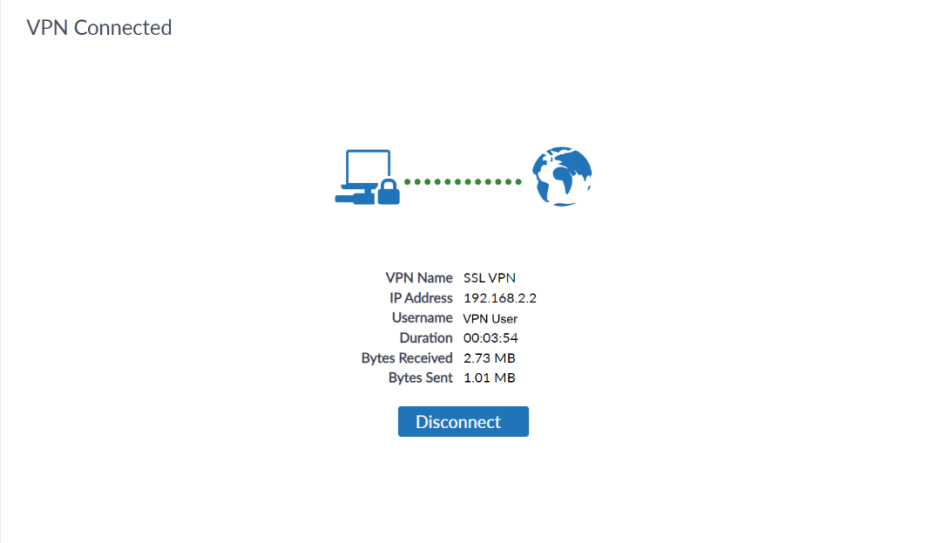
Set the VPN type to SSL-VPN. Configure an appropriate connection name and description. Configure the remote gateway as the IP address of the firewall's WAN interface that you found earlier. Ensure that the port is set to 10443 as configured earlier. Turn on Save Login and set the username to VPN User. Click Save.



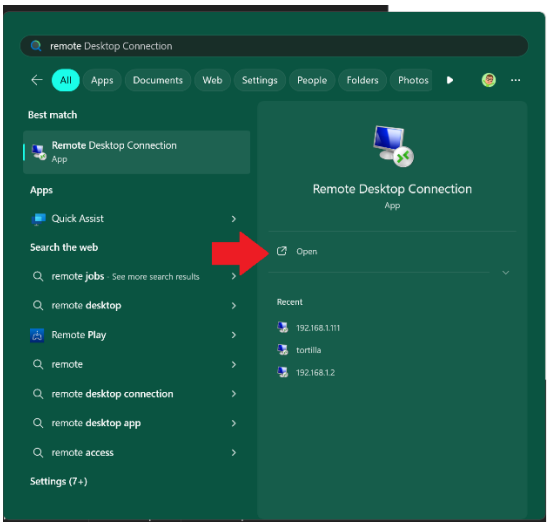
Select your VPN profile, type in the VPN User's username and password, and click connect.



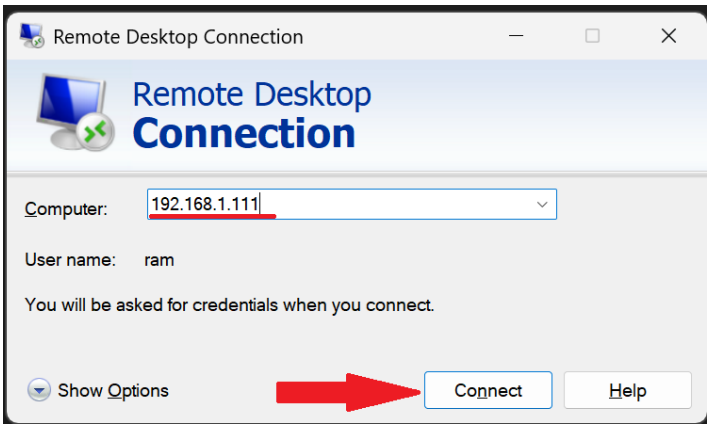
If the VPN connects successfully, you should see a screen like this:



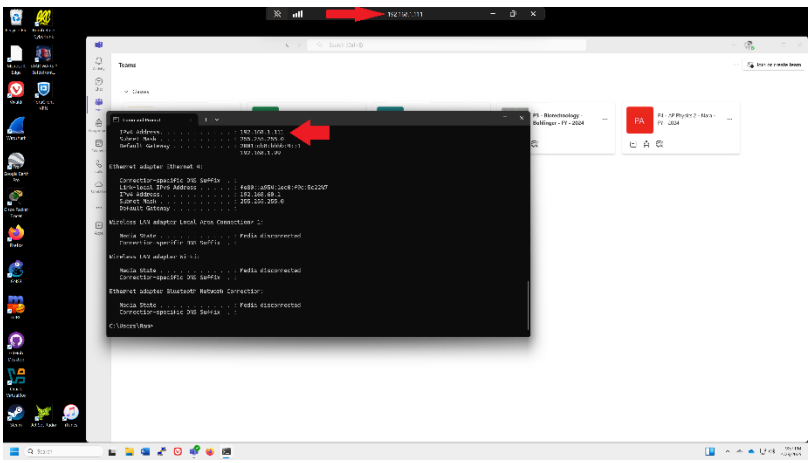
To test if the connection works, open the Remote Desktop Connection app.



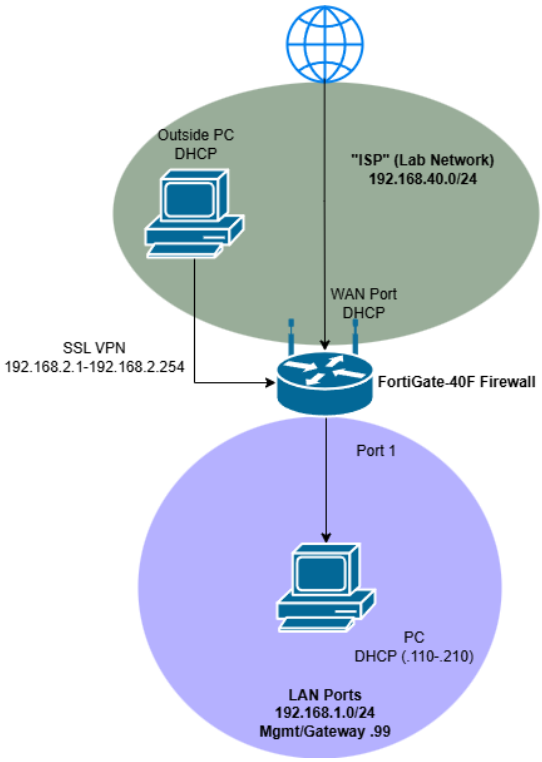
Enter the IP address of the inside computer and click Connect.



Here's a screenshot of the remote desktop connection from the outside PC to the inside PC, with the IP address of the inside PC visible:



Network Diagram (IPv4)



Problems

We originally tried to complete this lab with an IPSec VPN. For some reason, the IPSec VPN refused to work for anyone in our lab, so we decided to complete the lab with an SSL VPN instead.

Conclusion

To wrap up, while it's bizarre that this lab didn't work with IPSec, I was still very impressed with the ease of use that the Fortinet interface provides for setting up an SSL VPN. I am fully confident that I could set up this VPN configuration outside of a lab environment, especially with the refreshing change of pace from other firewall configuration interfaces.