

Understanding the Role of VPNs in Protecting Privacy and Secure Communication

This project demonstrates how Virtual Private Networks (VPNs) help protect user privacy and enable secure communication online. It involves hands-on steps using a Chrome-based VPN extension and highlights VPN functionality, encryption, and performance considerations.

Objective

To explore how VPNs change IP addresses, encrypt traffic, affect browsing speed, and contribute to secure and private internet usage.

1. Tasks Completed

Choose a reputable free VPN service and sign up

VPN Chosen: Proton VPN

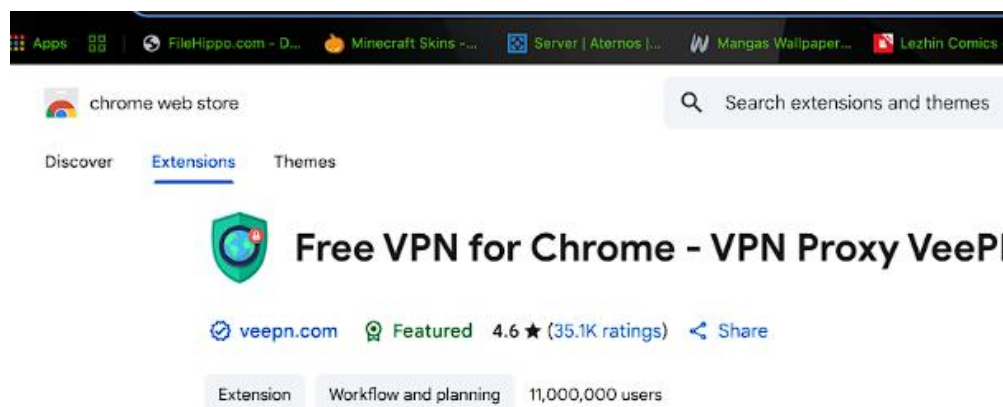
Why: No data limits on the free plan

No ads

Strong privacy policy

Reputable and based in Switzerland

Signup: Free VPN for Chrome – VPN Proxy VeePN



Downloaded and installed via Chrome Web Store.

2. Installation and Connection to VPN Server

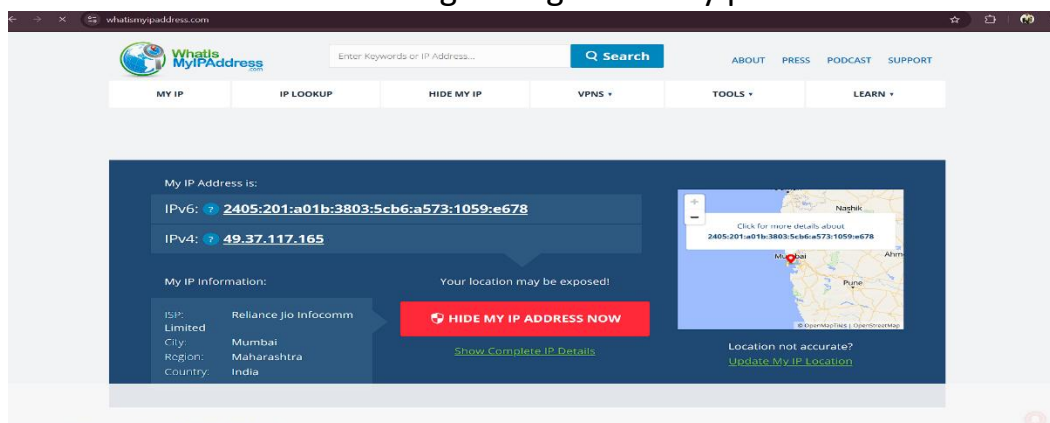
- Installed the VPN extension in Chrome.
- Signed up for a free account.

- Server Location Selected: Amsterdam
- Successfully connected.

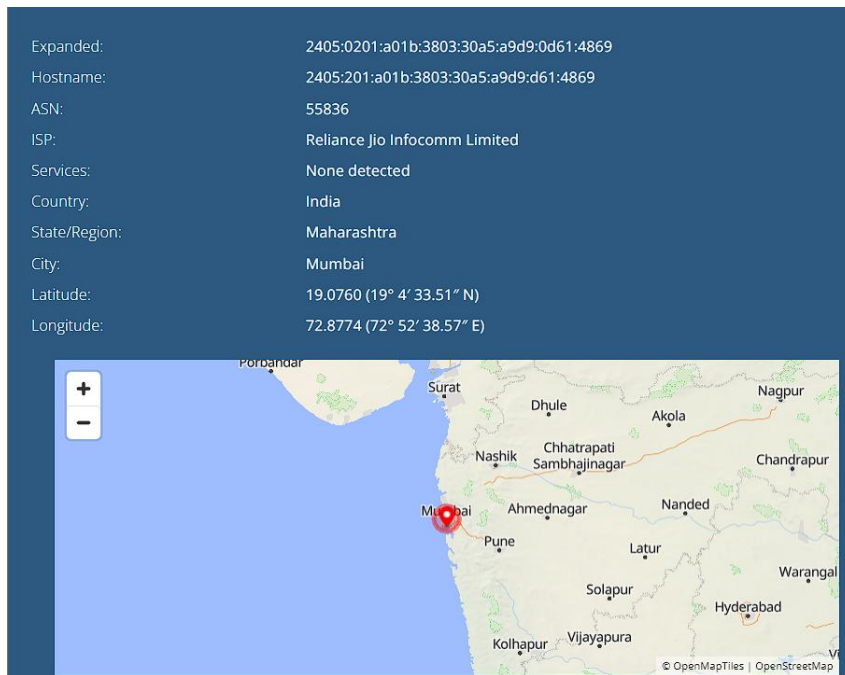


3. IP Address Verification

- Verified IP address change using whatismyipaddress.com



- After VPN (Mumbai IP)



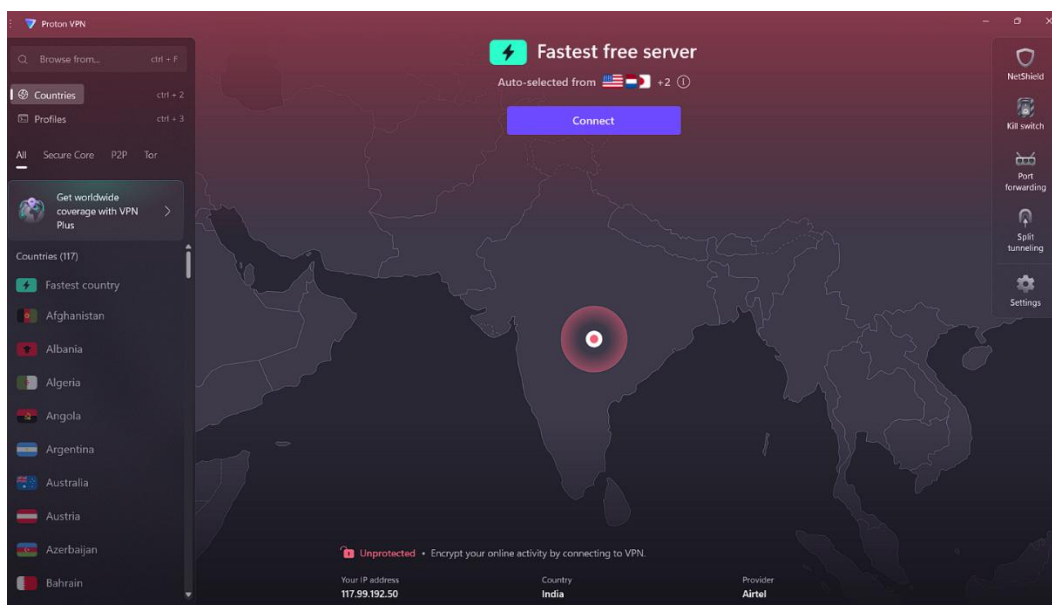
4. Traffic Encryption Confirmation

To confirm encrypted traffic:

Visit any secure website (e.g., <https://example.com>).

Click the lock icon in Chrome's address bar.

Click "Connection is secure" → then "Certificate" to view HTTPS encryption details.

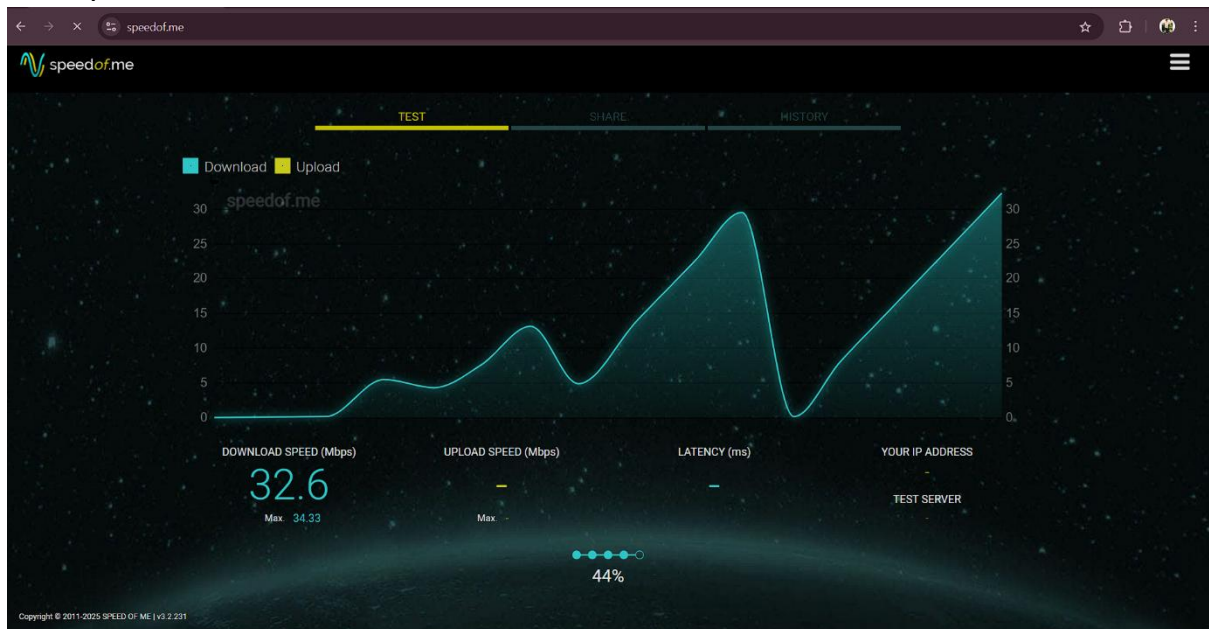


5. VPN Disconnected – Speed/IP Comparison

Disconnected from the VPN.

Compared IP and browsing speed on the same website.

Used the online website <https://speedof.me/> to test the speed of local network and vpn.



6. VPN Encryption & Privacy Features Research

- VPNs use protocols like OpenVPN, WireGuard, and IKEv2/IPSec.
- Key privacy features:
- IP masking
- No-log policies (provider dependent)

- DNS leak protection
- Kill switches

7. Summary: VPN Benefits and Limitations

- Benefits of Using a VPN:
 - Online Privacy: Hides your real IP, preventing tracking
 - Security: Encrypts data, especially useful on public Wi-Fi
 - Bypass Censorship/Geo-blocks: Access restricted content and websites
 - Prevent Bandwidth Throttling: Some ISPs throttle traffic — VPN may bypass this
- Limitations of Free VPNs:
 - Speed: Free plans often have slower speeds due to server load
 - Limited Locations: Fewer server choices than paid plans
 - Feature Restrictions: No streaming or P2P on free servers (e.g., with Proton VPN)
 - Trust Factor: Not all free VPNs are trustworthy; some may log or sell data

Conclusion

VPNs are powerful tools for enhancing digital privacy and securing online activities. This project provided practical experience in setting up, using, and analyzing the effectiveness of a VPN for everyday use.