VPN SERVICES

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SUMMARY

You can use "virtual private network" (VPN) services to securely access the Internet from public Internet services and to block future privacy intrusions by Internet providers.
TOPICS

• What is A "Virtual Private Network Service".
• Three "Virtual Private Network Services"
• Using Virtual Machines to Enhance The Security of Public Internet Access
TOPICS (continued)

- Security Complexities With Bank And Stock Brokerage Web Sites
- Using a Virtual Private Network Service As A Temporary Workaround For Slow Broadband Internet Access
• Use VPN services to access restricted Web sites and restricted Web-based services
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE"?
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE"?

- An analogy to explain how a "virtual private network" works can be found at http://www.pcmag.com/article2/0,2817,2403388,00.asp which is as follows:
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE"? (continued)

<start of quote:> If your car pulls out of your driveway, someone can follow you and see where you are going, how long you are at your destination, and when you are coming back. With a VPN service, you are essentially driving into a closed parking garage, switching to a different car, and driving out, and no one who was originally following you knows where you went. <end of quote>
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE"? (continued)

- A local area connection that has been encrypted and then "tunneled" from your local computer to a virtual private network server somewhere on a server farm out on the Internet.

- Your computer "sees" a virtual network card as it's Internet connection.
Encrypted Tunnel

You

Eavesdroppers & Hackers

Government & Corporate Blocks

VPN Provider

The Internet
When you use a "Virtual Private Network Service", the Virtual Private Network client software creates a virtual network adapter for your computer.
Your Virtual Private Network client software (part of "Windows...") creates takes all Ethernet packets that are generated by the virtual network adapter, encrypts these packets, and wraps them up for transmission by your real network adapter.
Blue items are part of the VPN service's secure encrypted tunnel

Red items are part of regular unencrypted Internet data communications traffic
Unencrypted network data

Encrypted network data

Real network adapter

Internet cloud
Your "Windows..", Mac, or Linux Computer

Your Web browser and/or Email client and/or FTP program

Virtual Network Adapter Provided by VPN Client Software (p/o "Windows")

Real WiFi or Ethernet Adapter
At the VPN service's site, their VPN server unwraps and unencrypts your Ethernet packets and sends them out to the general unencrypted Internet through another virtual network adapter.
VPN Server of VPN Service

Virtual Network Adapter Provided by VPN Server

Real WiFi or Ethernet Adapter
When you use a "Virtual Private Network Service", your computer is logically connected to a spot on the Internet with the Internet used as means of secure transport:
Your "Windows..", Mac, or Linux Computer

Your Web browser and/or Email client and/or FTP program

Virtual Network Adapter Provided by VPN Client Software

VPN Service's VPN Server

Cloned Virtual Network Adapter (=tunnel endpoint)
Internet Explorer, other Web browsers, e-mail client programs, FTP client problems, etc.
connect to
virtual network adapter created by VPN software
connects to
real network adapter
connects to the Internet
At the server farm end, the Internet connects to a virtual network adapter created by VPN server connects to real local network.
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE" (continued)?

- A "virtual private network service" has one mandatory feature at the remote server farm end: At the remote server farm end, the virtual private network server connects to a router that provides you with access to the Internet.
Internet Explorer, other Web browsers, e-mail client programs, FTP client problems, etc. connect to virtual network adapter created by VPN software connects to real network adapter connects to the Internet
At the server farm end, the Internet connects to a virtual network adapter created by VPN server connects to real local network connects to the Internet.
Your "Windows..", Mac, or Linux Computer

Your Web browser and/or Email client and/or FTP program

Virtual Network Adapter Provided by VPN Client Software

VPN Server of VPN Service

Cloned Virtual Network Adapter (=tunnel endpoint)
Your "Windows..", Mac, or Linux Computer

"Opera" Web browser

Virtual Network Adapter Provided by and for the "Opera" Web browser

VPN Server of Opera's SurfEasy VPN Service

Cloned Virtual Network Adapter (=tunnel endpoint)
Routers owned and controlled by your Internet Provider (usually close to your location)

Routers not owned and controlled by your Internet Provider

Cloned Virtual Network Adapter Provided by VPN server of VPN Service (Toronto, NYC, etc.)
ADVANTAGES OF A "VIRTUAL PRIVATE NETWORK SERVICE"

• All network traffic between your computer and the VPN server provided by the service is encrypted including your local WiFi radio signals and your local router's Ethernet packets in both directions.
ADVANTAGES OF A "VIRTUAL PRIVATE NETWORK SERVICE"

• All network traffic going through your Internet provider's routers (which is easy for them to analyze and monitor) is encrypted so that they cannot analyze and monitor it without massive expense and computer processing power.
EXAMPLE OF A VERY UNSECURE PUBLIC WIFI INTERNET ACCESS
HIExpressSantaClara Wireless Network Prope...

Connection

Name: H
SSID: H
Network type: Access point
Network availability: All users

- Connect automatically when this network is in range
- Look for other wireless networks while connected to this network
- Connect even if the network is not broadcasting its name (SSID)

Security
EXAMPLE OF A SLIGHTLY MORE-SECURE PUBLIC WIFI INTERNET ACCESS
Welcome to Holiday Inn® e-Host™ high speed Internet access

It's free — just click and go.

Please read the Terms & Conditions. If you accept the Terms, enter the access code provided to you. If you do not have an access code, please contact the front desk.

Access Code: 

- I accept the Terms & Conditions.

Access the Web
Wi-Fi

Intel(R) WiFi Link 1000 BGN
Wi-Fi Status

General

Connection
- IPv4 Connectivity: Internet
- IPv6 Connectivity: No Internet access
- Media State: Enabled
- SSID: Home
- Duration: 01:26:16
- Speed: 52.0 Mbps
- Signal Quality:

Activity
- Sent: 3,889,668
- Received: 10,765,224

Buttons:
- Details...
- Wireless Properties
- Properties
- Disable
- Diagnose
- Close
Name: Holiday Inn Express
SSID: Holiday Inn Express
Network type: Access point
Network availability: All users

- Connect automatically when this network is in range
- Look for other wireless networks while connected to this network
- Connect even if the network is not broadcasting its name (SSID)
Security type: WPA2-Personal
Encryption type: AES
Network security key: blue

Show characters

Advanced settings
ADVANTAGES OF A "VIRTUAL PRIVATE NETWORK SERVICE" (continued)

- Web servers and other servers on the Internet see your computer as residing at the location of the VPN server of the VPN service, so can access services and Web server that are blocked in your country, if your VPN server has VPN servers that are in countries outside of the one that you are located in.
Security Complexities With Bank And Stock Brokerage Web Sites

• Many bank and stock brokerage Web sites memorize the IP address that you are logging in from.

• All free VPN services give you a different IP address with each connection that you make with them.
Security Complexities With Bank And Stock Brokerage Web Sites (continued)

• This causes many bank and stock brokerage Web sites to initiate various verification processes such as sending you a "verification code" to you via an email message or a text message or a voice phone call to you.
You are then required to enter this code as part of the login process at their Web site.
Security Complexities With Bank And Stock Brokerage Web Sites (continued)

• Some of the more expensive not-free "VPN" services assign you a permanent dedicated IP address and this avoids the problem caused by banks and stock brokerage Web sites that monitor the IP address that you are logging in from.
THREE "VIRTUAL PRIVATE NETWORK SERVICES"

• "Hotspot Shield"
• "TunnelBear"
• "VPNReactor"
• The free version of "Hotspot Shield" displays a 1-inch advertising bar at the top of most Web browsers.
• The free version of "TunnelBear" limits the amount of data that you can upload and download each month.
• The free version of "VPNReactor" limits you to 30 minutes at a time with a 30 minute interval between access periods.
ADVICE ON USING "HOTSPOT SHIELD"

• See

http://aztcs.org/meeting_notes/winhardsig/vpnservices/VPNs-HotspotShield.pdf
ADVICE ON USING "TUNNELBEAR"

• See
  http://aztcs.org/meeting_notes/winhardsig/vpnservices/VPNs-TunnelBear.pdf
ADVICE ON USING "VPNREACTOR"

• See
  http://aztcs.org/meeting_notes/winhardsig/vpnservices/VPNs-VPNReactor.pdf
VPN SERVICES FOR MACS

- http://mac.tutsplus.com/tutorials/os-x/how-to-use-vpn-on-your-mac/
- http://www.hotspotshield.com/vpn-for-mac
- https://vpnreactor.com/setup_tutorials.html
- https://www.tunnelbear.com/
DISADVANTAGES OF FREE VPN SERVICES

- Slower Internet upload and download speeds relative to paid VPN services
- Less stable VPN servers relative to paid VPN services
DISADVANTAGES OF FREE VPN SERVICES (continued)

- Limitations for upload and download data caps and advertising bars on Web browsers
- Less or no control over which VPN server or VPN server location that you are connecting to.
USING "VIRTUAL MACHINES" TO ENHANCE THE SECURITY OF PUBLIC INTERNET ACCESS

- When you use a "virtual machine" with an external USB WiFi adapter, you can isolate your real, host computer from viruses and malware and the virtual machine provides you with redundancy from equipment failures and theft.
USING "VIRTUAL MACHINES" TO ENHANCE THE SECURITY OF PUBLIC INTERNET ACCESS

(continued)

- See
  http://aztcs.org/meeting_notes/winhardsig/vpnservices/VMs-secureInternet.pdf
USING "VIRTUAL PRIVATE NETWORK" SERVICES AS A WORKAROUND FOR SLOW BROADBAND INTERNET ACCESS

- See

http://aztcs.org/meeting_notes/winhardsig/vpnservices/vpnservices-slowinternet.pdf