

VPN SERVICES

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“Meeting Notes”

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

TOPICS (continued)

- Use VPN services to access restricted Web sites and restricted Web-based services

WHAT IS A
"VIRTUAL
PRIVATE
NETWORK
SERVICE"?

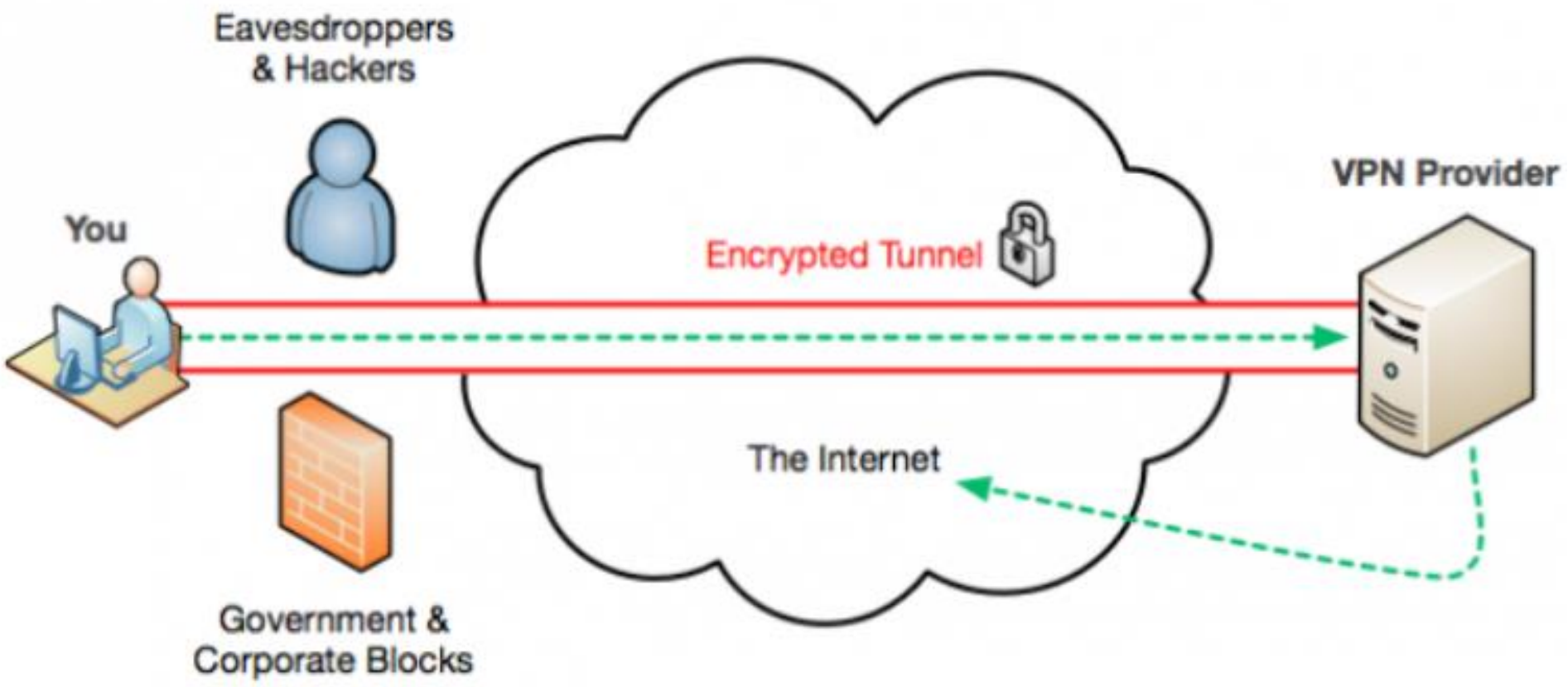
WHAT IS A "VIRTUAL PRIVATE NETWORK SERVICE"?

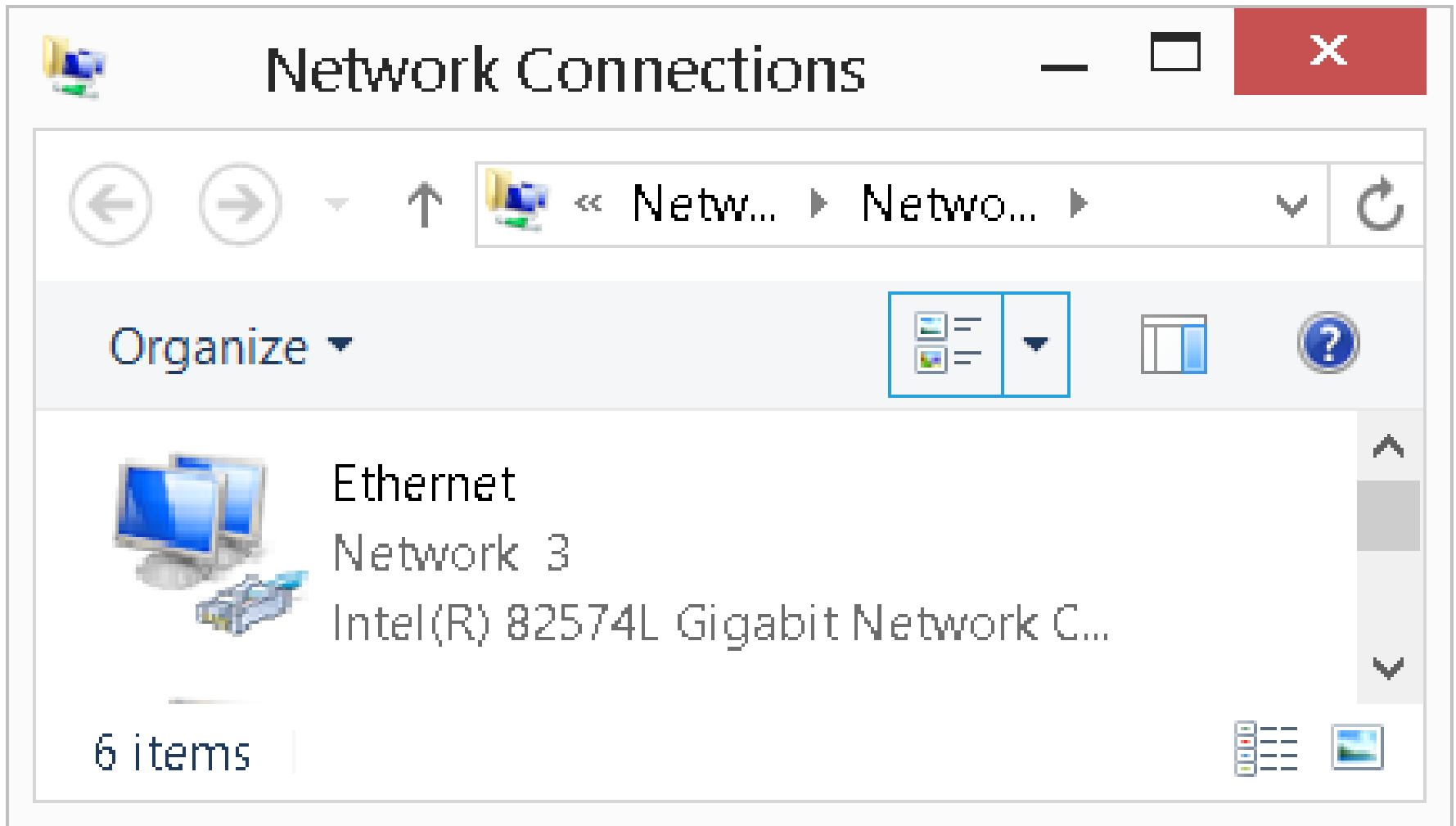
- An analogy to explain how a "virtual private network" works can be found at <http://www.pcmag.com/article2/0,2817,2403388,00.asp> which is as follows:

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.





Network Connections

Network and In... Network Connections

Organize Disable this network device

<input checked="" type="checkbox"/>	Ethernet Network 3 Intel(R) 82574L Gigabit Network C...	<input type="checkbox"/>	Ethernet 2-HS Network 4 Anchorfree HSS VPN Adapter
<input type="checkbox"/>	Local Area Connection-TB Network cable unplugged TAP-Win32 Adapter V9	<input type="checkbox"/>	VPN Connection-FC Disconnected WAN Miniport (PPTP)
<input type="checkbox"/>	VPNReactor-L2TP Disconnected WAN Miniport (L2TP)	<input type="checkbox"/>	VPNReactor-PPTP Disconnected WAN Miniport (PPTP)

6 items | 1 item selected


WAN Miniport (F

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**



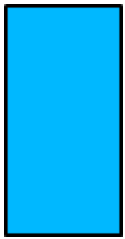
**Red items are part of
regular unencrypted
Internet data
communications
traffic**



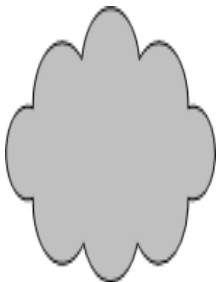
Unencrypted network data



Encrypted network data



Real network adapter



Internet cloud

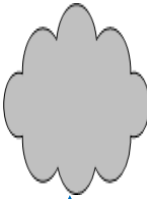
Your "Windows..", Mac, or Linux Computer



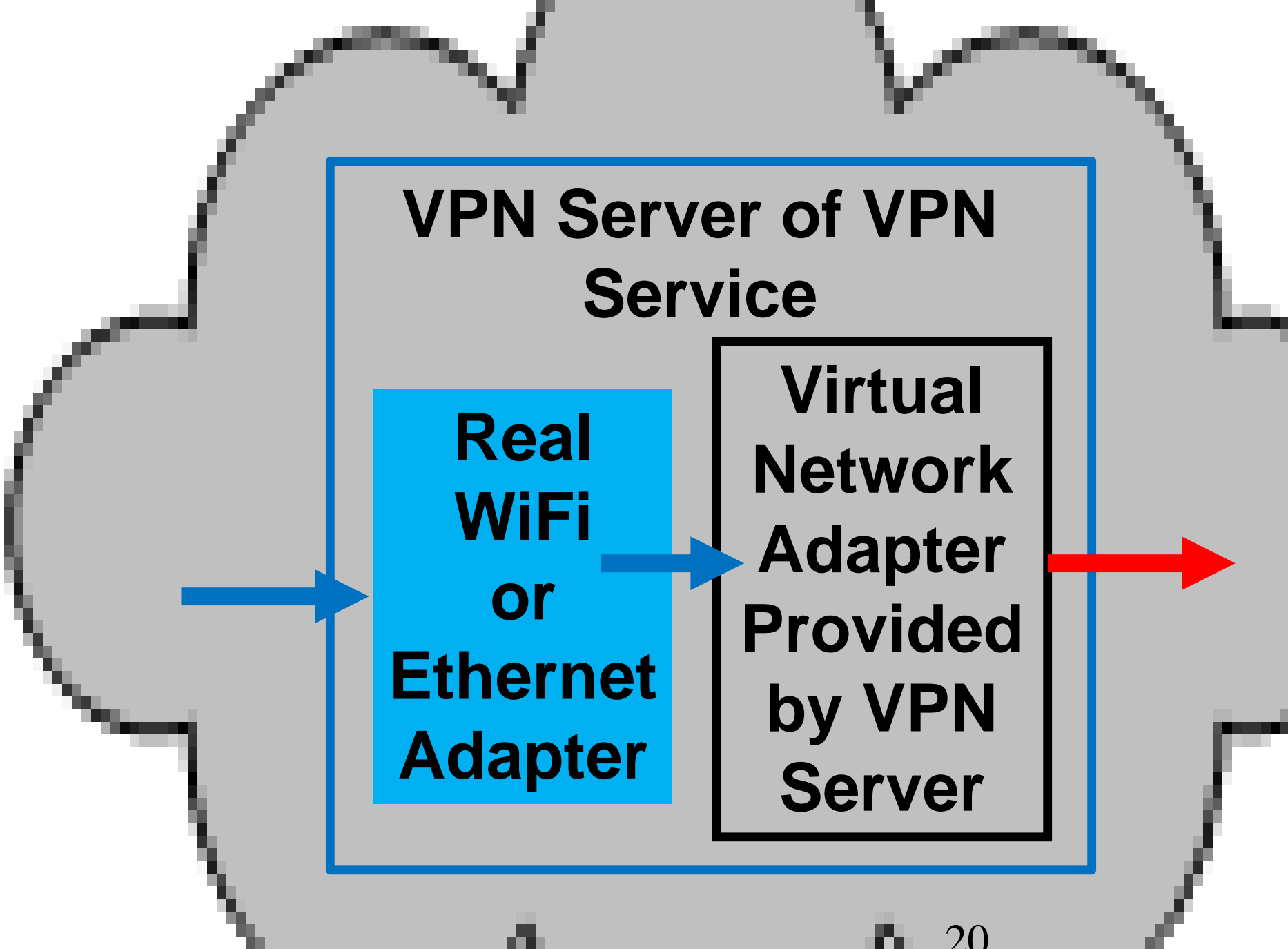
Your Web browser and/or Email client and/or FTP program

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

Real WiFi or Ethernet Adapter

Virtual Network Adapter Provided by VPN Server

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:

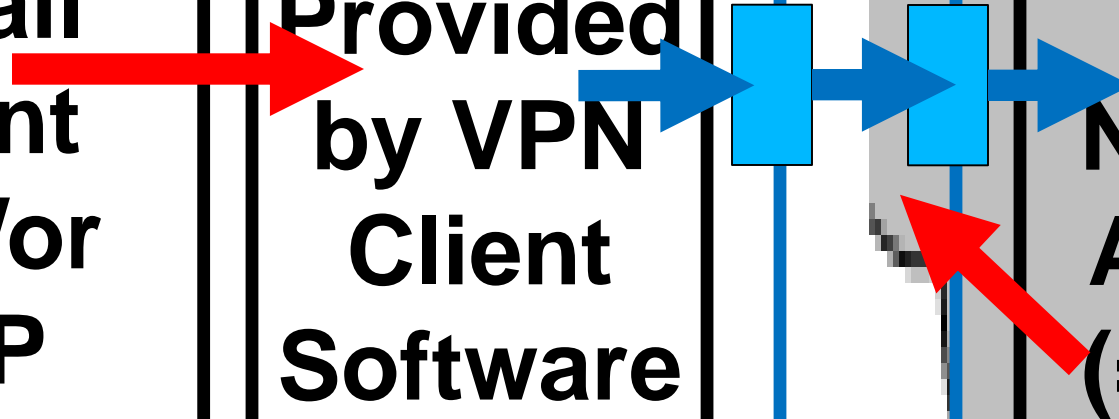
Your "Windows..", Mac, or Linux Computer

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
programs, 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
programs, 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.

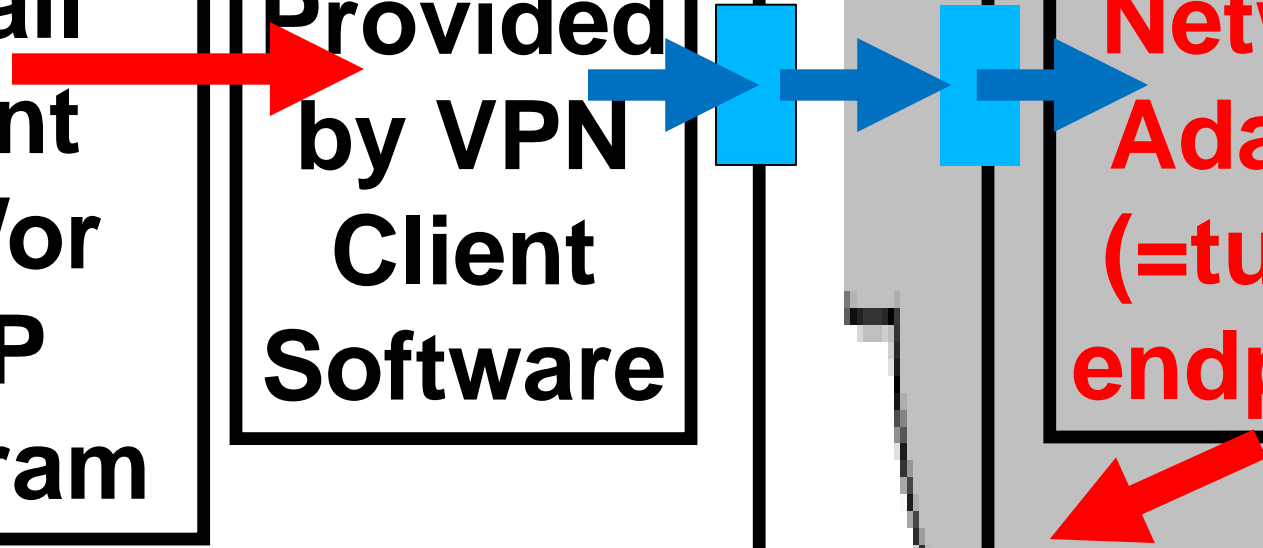
**Your "Windows..", Mac,
or Linux Computer**

**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)**



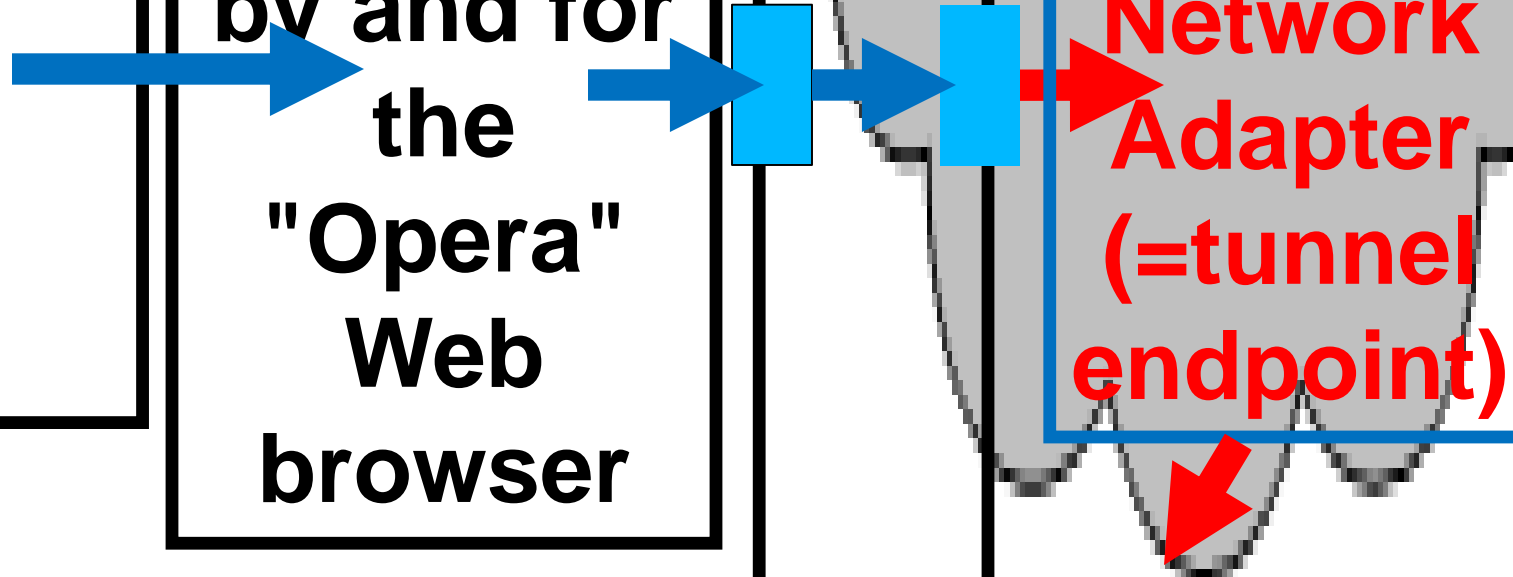
**Your "Windows..", Mac,
or Linux Computer**

**"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**

Network Connections

Control Panel > Network and Internet > Network Connections

Organize

- Bluetooth Network Connection
Not connected
Bluetooth Device (Personal Area ...
- VMware Network Adapter VMnet8
Unidentified network
VMware Virtual Ethernet Adapter ...
- Ethernet
Disabled
Realtek PCIe GBE Family Controller
- Wi-Fi
HI [redacted]
Intel(R) WiFi Link 1000 BGN
- VMware Network Adapter VMnet1
Unidentified network
VMware Virtual Ethernet Adapter ...

5 items



Wi-Fi Status



General

Connection

IPv4 Connectivity: Internet
IPv6 Connectivity: No Internet access
Media State: Enabled
SSID: HI [redacted]
Duration: 00:21:39
Speed: 58.0 Mbps
Signal Quality:

Details...

Wireless Properties

Activity

Sent — — Received
Bytes: 1,511,108 | 5,138,773

Properties

Disable

Diagnose

Close

HiExpressSantaClara Wireless Network Properties



Connection Security

Name: H [redacted]

SSID: H [redacted]

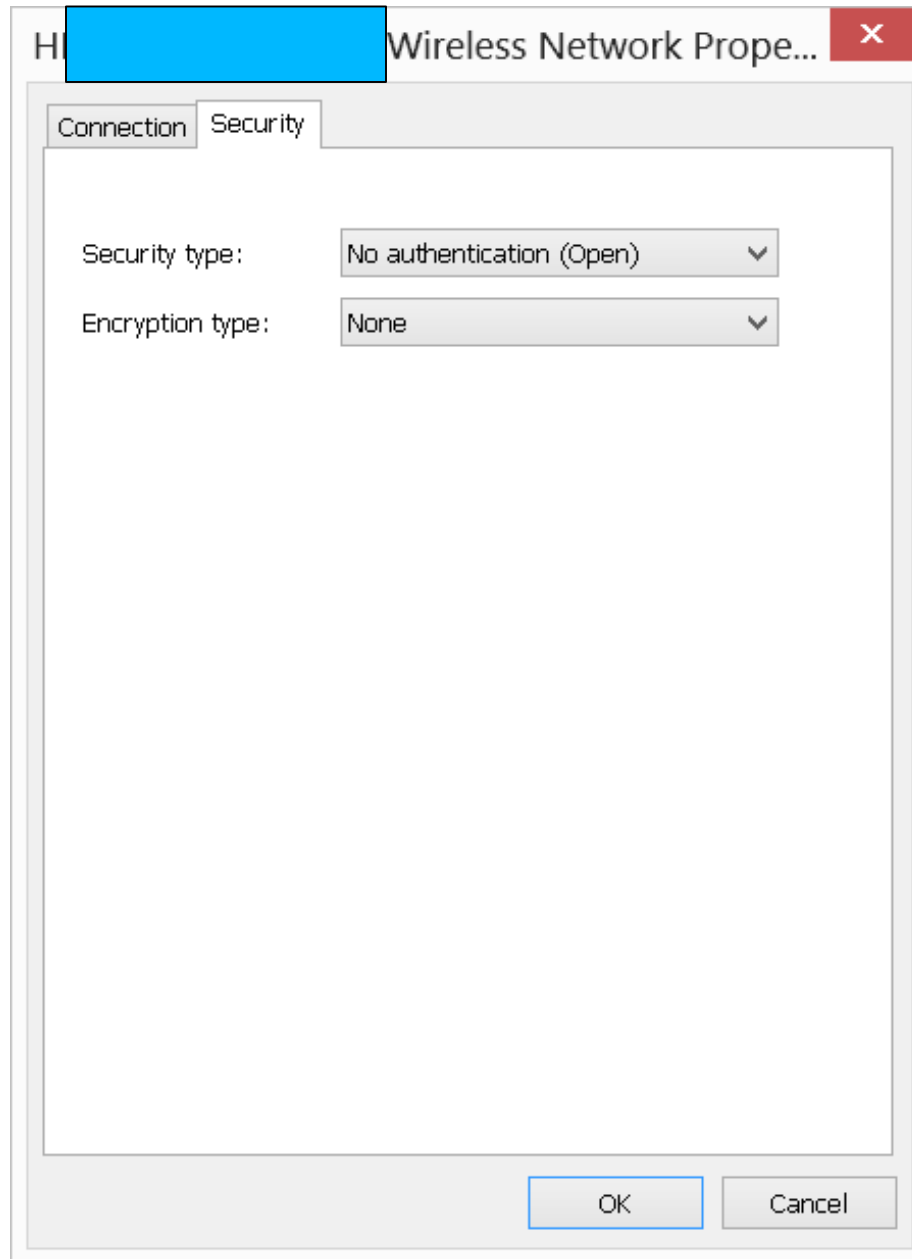
Network type: Access point

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)

OK

Cancel



**EXAMPLE OF A
SLIGHTLY MORE-
SECURE PUBLIC
WIFI INTERNET
ACCESS**



Welcome to [Redacted]® 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.

[Redacted], Inc.
Terms of Use of Internet

TERMS, CONDITIONS AND NOTICES

AGREEMENT BETWEEN CUSTOMER AND [Redacted] HOTELS, INC
The Service ("Service") consists of providing a wireless or high speed internet connection to authorized users.

This Service is offered to you, the customer, conditioned on your acceptance without modification of the terms, conditions, and notices contained herein. Your use of this Service constitutes your agreement to all such terms, conditions, and notices.

SECURITY OF YOUR ACCESS AND USE
Due to the nature of wireless LAN and High Speed Internet Access networks, control of physical

Access Code:

I accept the Terms & Conditions.

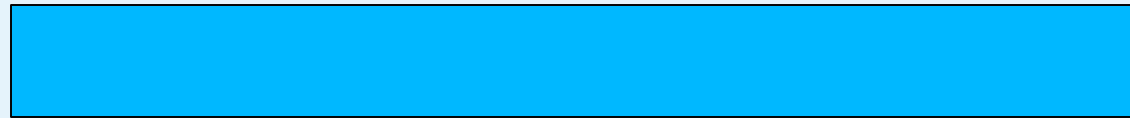
Access the Web





Wi-Fi

H



Intel(R) WiFi Link 1000 BGN



Wi-Fi Status



General

Connection

IPv4 Connectivity: Internet


IPv6 Connectivity: No Internet access

Media State: Enabled

SSID: Hc [REDACTED]

Duration: 01:26:16

Speed: 52.0 Mbps

Signal Quality: 


Details...


Wireless Properties

Activity

Sent —  — Received

Bytes: 3,889,668 | 10,765,224

 Properties

 Disable

Diagnose

Close

Holiday Inn Express Metrotown Wireless Net...



Connection Security

Name: Hd [redacted]

SSID: Hd [redacted]

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)

OK

Cancel



Connection Security

Security type: WPA2-Personal

Encryption type: AES

Network security key: ●●●●●●●●

Show characters

Advanced settings

OK

Cancel



Connection Security

Security type: WPA2-Personal

Encryption type: AES

Network security key best

Show characters

Advanced settings

OK

Cancel

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.

Security Complexities With Bank And Stock Brokerage Web Sites (continued)

- 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"

THREE "VIRTUAL PRIVATE NETWORK SERVICES" (continued)

- The free version of "Hotspot Shield" displays a 1-inch advertising bar at the top of most Web browsers.

THREE "VIRTUAL PRIVATE NETWORK SERVICES" (continued)

- The free version of "TunnelBear" limits the amount of data that you can upload and download each month.

THREE "VIRTUAL PRIVATE NETWORK SERVICES" (continued)

- 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_](http://aztcs.org/meeting_notes/winhardsig/vpnservices/VMs-secureInternet.pdf)
[notes/winhardsig/vpnserv](http://aztcs.org/meeting_notes/winhardsig/vpnservices/VMs-secureInternet.pdf)
[ices/VMs-](http://aztcs.org/meeting_notes/winhardsig/vpnservices/VMs-secureInternet.pdf)
[secureInternet.pdf](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