

How to install and run an OpenVPN client on your Windows-based PC

The DIL/NetPC ADNP/9200 is also available with a preinstalled OpenVPN server. This allows secure VPN connections between a PC as an OpenVPN client and the ADNP/9200. Before accessing the ADNP/9200 through a VPN tunnel please install and setup an OpenVPN client on your PC.

• **1. Step**: Visit <u>http://openvpn.net</u> and download the latest stable version of the OpenVPN Windows install file (in this case **openvpn-2.0.9-install.exe**).

Downloads - Windows Internet E	xplorer										
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Downloads											
OpenVPN 2.0.9 - released on 2006.10.01 (Change Log) Source code and Windows packages are provided below. If you are installing OpenVPN from an RPM package, don't forget to install an L20 package as well (see below for <u>L20 packages</u>). Binary RPM packages for this version are usually available within a few days after the release date from <u>Dag Wisers</u> RPM site (or <u>build one yourself</u>). If yourd Bine the Windows (III version of OmNVPN, you can set it from Mathia Samdama's OpenVPN GII site.											
Source Tarball	openvpn-2.0.9.tar.gz	GnuPG Signature									
Source Zip	openvpn-2.0.9.zip	GnuPG Signature									
Windows Installer	openvpn-2.0.9-install.exe	GnuPG Signature									
Latest Beta Releases This f	older contains beta releases which are prima	rily directed to develo	→ pers and testers.								
OpenVPN 2.1 rc7 - released on 2008.01.29 (Change Log). The OpenVPN 2.1 beta series is ready for testing and limited production usage. Major new features include: . Windows Vista-ready on both x86 and x64. . OpenVPX 2015 nov packaged in the Windows installer. . OpenVPX 2015 nov packaged in the Windows installer. . TAP-Win29 adapter can now be opened from non-subministrator mode. . PKCS ±11 classes for usage of cryptographic tokens ("mart card"). . minimum feature to anable UDP-based multihoming of the server on multiple interfaces. . or sthare feature to allow OpenVPX and an HTTPS server to share TCP port _43. See the magae for more information anable features.											
Source Tarball	openvpn-2.1_rc7.tar.gz	GnuPG Signature									
Source Zip	openvpn-2.1_rc7.zip	GnuPG Signature									
Windows Installer	openvpn-2.1_rc7-install.exe	GnuPG Signature									
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• **2. Step**: Then run the install file **openvpn-2.0.9-install.exe** on your PC and install all OpenVPN components.





🏠 OpenVPN 2.0.9 Setup	
Choose Components Choose which features of OpenVPN 2.0.9 you want t	o install.
Select the components to install/upgrade. Stop any OpenVPN processes or the Op service if it is running. All DLLs are installed locally.	Installation Complete Setup was completed successfully.
Select components to install:	Completed Output folder: C:\Programme\OpenVPN Extract: INSTALL-win32.bxt Extract: license.txt 100% Create shortcut: C:\Dokumente und Einstellungen\KDW\Startmenü\Programme\Open Create shortcut: C:\Dokumente und Einstellungen\KDW\Startmenü\Prog

• **3. Step**: Wait until the OpenVPN installation is finished. After that you will find an OpenVPN item within your Windows program menu. OpenVPN is also available over the Windows command line.

CopenVPN	Add a new TAP-Win32 virtual ethernet adapter	
m PDFCreator	Delete ALL TAP-Win32 virtual ethernet adapters	
🛅 Nero	🤼 Generate a static OpenVPN key	
im Microsoft Developer Network	🛅 OpenVPN configuration file directory	
im Microsoft Web Publishing	OpenVPN HOWTO	
ANYCOM Blue USB-200-250	OpenVPN log file directory	schnology 🕨
m PSPad editor	🦻 OpenVPN Manual Page	
i awhttpd	OpenVPN Sample Configuration Files	
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🐒 Network Stumbler	OpenVPN Windows Notes	
im Kiwi Enterprises	🥼 Uninstall OpenVPN	and the second se
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mobile PhoneTools		
🛅 Trap Receiver		
💼 ElsterFormular 2005-2006		
m AntiVir PersonalEdition Classic		
im WinPcap		
im Wireshark		
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We assume for the following steps that the OpenVPN installation directory on your Windows PC is **c:\Program Files\OpenVPN**.





• **4. Step**: Download the OpenVPN GUI for Windows from <u>http://openvpn.se</u>. Please note: The next Windows versions of OpenVPN (2.1 or later) will include this tool. Version 2.0.9 needs the separate download and installs steps.

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Information					<u></u>			
Documentation Home How-To Links Screenshots What's New Download Stable	Download If you already ha GUI executable a OpenSSL DLLs If you don't have you.	I Stable Release ve a working installation of OpenVPN, yo alone. Make sure you save it in the same that OpenVPN has installed in this folder OpenVPN installed, use the installation p	u can use the "Application only" folder as openypn.exe, as Oper vackage below, which will install	link below to download the OpenVPN nVPN GUI is dependent on the both OpenVPN and OpenVPN GUI for	Autory Google (VY) Free Remote Control / VYC Desktop Sharing and File Transfer Passes Firewalls, No Installation, www.teamviewer.com Registry Cleaner			
Development All Files Communicate Forum E-mail me	Installation Pac openvpn-2.0.9-g Application on openvpn-gui-1.0 Application on	:kage (Both 32-bit and 64-bit TAP driv uu-1.0.3-install exe ly: .3.exe b: (without Change Password feature	er included):		Download Download Free Registry Scan Recommended and Used By The Experts www.pdools.com			
Other • <u>My Certificate Wizard</u>	openvpn-gui-1.0 Source Code: openvpn-gui-1.0	openvpn-gui-1.0.3.zip						
An by Google / 12 <u>Aventurin(e)</u> Create and manage Linux based virtual servers with	Localized Vers To use a localize package from o (C:\program file:	ions: ad version, first install OpenVPN using the penvpn net, then download one of the bin stopenvpn/bin).	e above installation package, or aries below and save it as open	the official OpenVPN installation wpn-gui.exe in OpenVPN's bin folder	Fix Setup.exe Top Setup.exe Error Repair Tool Free Download – 100% Guaranteed Registy ToolsReview.net			
ease www.aventurin.net	Language	Application only	Source Code (.rc-file)	Maintainer				
	French	openvpn-gui-1.0.3-fr.exe	openvpn-gui-fr.rc	Sam Przyswa				
	German	openvpn-gui-1.0.3-de.exe	openvpn-gui-de.rc	Patrick Steiner				
	Italian	openvpn-gui-1.0.3-it.exe	openvpn-gui-it.rc	Fulvio Capone				
	Norwegian	openvpn-gui-1.0.3-no.exe	openvpn-gui-no.rc	Morten Karlsen				
	Spanish	openvpn-gui-1.0.3-es.exe	openvpn-gui-es.rc	Ruben Cardenal				
	Swedish	openvpn-gui-1.0.3-se.exe	openvpn-gui-se.rc	Mathias Sundman				
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- **5. Step**: Store the *.exe (e.g. **openvpn-gui-1.0.3.exe**) file with the OpenVPN GUI for Windows on your PC. The Windows program directory **c:\Program Files\OpenVPN\bin** is a good place.
- **6. Step**: Create a desktop icon for the OpenVPN GUI for Windows and then run the OpenVPN GUI. This creates a new small icon within the Windows system tray.



• 7. Step: Copy the file client.ovpn from the directory c:\Program Files\OpenVPN\sampleconfig to the directory c:\Program Files\OpenVPN\config.



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- 8. Step: Please rename the file c:\Program Files\OpenVPN\config\client.ovpn to the new name client-adnp9200.ovpn.
- **9. Step**: Please edit the configuration file **client-adnp9200.ovpn** and change the following five lines within this text file (see the red coloured and <u>underlined</u> text lines in the next sample configuration file).

```
****
# Sample client-side OpenVPN 2.0 config file #
# for connecting to multi-client server.
                                         #
#
                                         #
# This configuration can be used by multiple
                                         #
# clients, however each client should have
                                         #
# its own cert and key files.
                                         #
#
                                         #
                                         #
# On Windows, you might want to rename this
# file so it has a .ovpn extension
                                         #
******
# Specify that we are a client and that we
# will be pulling certain config file directives
# from the server.
client
# Use the same setting as you are using on
# the server.
# On most systems, the VPN will not function
# unless you partially or fully disable
# the firewall for the TUN/TAP interface.
dev tap
;dev tun
# Windows needs the TAP-Win32 adapter name
# from the Network Connections panel
```



if you have more than one. On XP SP2, # you may need to disable the firewall # for the TAP adapter. ;dev-node MyTap # Are we connecting to a TCP or # UDP server? Use the same setting as # on the server. ; proto tcp proto udp # The hostname/IP and port of the server. # You can have multiple remote entries # to load balance between the servers. remote 192.168.0.126 1701 ;remote my-server-2 1194 # Choose a random host from the remote # list for load-balancing. Otherwise # try hosts in the order specified. ;remote-random # Keep trying indefinitely to resolve the # host name of the OpenVPN server. Very useful # on machines which are not permanently connected # to the internet such as laptops. resolv-retry infinite # Most clients don't need to bind to # a specific local port number. nobind # Downgrade privileges after initialization (non-Windows only) ;user nobody ; group nobody # Try to preserve some state across restarts. persist-key persist-tun # If you are connecting through an # HTTP proxy to reach the actual OpenVPN # server, put the proxy server/IP and # port number here. See the man page



if your proxy server requires # authentication. ;http-proxy-retry # retry on connection failures ;http-proxy [proxy server] [proxy port #] # Wireless networks often produce a lot # of duplicate packets. Set this flag # to silence duplicate packet warnings. ; mute-replay-warnings # SSL/TLS parms. # See the server config file for more # description. It's best to use # a separate .crt/.key file pair # for each client. A single ca # file can be used for all clients. ca ca.crt cert client1.crt key client1.key # Verify server certificate by checking # that the certicate has the nsCertType # field set to "server". This is an # important precaution to protect against # a potential attack discussed here: # http://openvpn.net/howto.html#mitm # # To use this feature, you will need to generate # your server certificates with the nsCertType # field set to "server". The build-key-server # script in the easy-rsa folder will do this. ;ns-cert-type server # If a tls-auth key is used on the server # then every client must also have the key. ;tls-auth ta.key 1 # Select a cryptographic cipher. # If the cipher option is used on the server # then you must also specify it here. ;cipher x # Enable compression on the VPN link. # Don't enable this unless it is also



enabled in the server config file. ;comp-lzo # Set log file verbosity. verb 3 # Silence repeating messages ;mute 20

• **10. Step**: Setup the Ethernet LAN link between the LAN1 connector of the DNP/SK27 starter kit and your PC. Use an Ethernet cross-over cable or a switch-based infrastructure for this LAN connection. We assume for the following steps that the ADNP/9200 is using the IP address 192.168.0.126.



• **11. Step:** Run a web browser on your PC and access the ADNP/9200 web interface with the URI <u>http://192.168.0.126:7777</u> or <u>http://192.168.0.126:7777/cgi-bin/login.cgi</u>. Please use the logon password **adnp** for your login.





• 12. Step: Select the menu item System and the sub-menu item Time and date. Then select Manual (Set your time and date manually) and press the Apply button. This sets the ADNP/9200-internal real time clock to the current time and date. The valid time is necessary to use OpenVPN. Without a time setting the pre-build OpenVPN certificates are invalid.

E http://192.168.0.74:7777	//cgi-bin/login.cgi - Windows Internet Ex	plorer	
💽 🗸 🔤 http://192.168.0	D.74:7777/cgi-bin/login.cgi		Google
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			Configuration
	Time and date configuration	1	
Contract of the second s	Local timezone configuration		
Status	Timezone :	UTC-02:00 🗸	Choose your timezone
System identification System management	Time and date configuration		
Time and date COM ports	Manual :	e	Set your time and date manually
Remote access Administration	Via NTP service :	0	Get time and date via NTP service
Network	Date :	2008 : July 💙 : 03	Current date (YYYY : month : DD)
Services	Time :	09 :10 :07	Current time (HH : MM : SS)
Logout	Current system time		
	Time and date :	Thu, 03.07.2008 09:10:26	Time and date of this system is shown
© 2007 SSV			OK Apply Cancel
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• 13. Step: Click with the right mouse button to the buttons Root CA, Key1 and Cert1. Download and save all three files to the PC directory c:\Program Files\OpenVPN\config.

C http://192.168.0.74:7777										
🗿 🗸 🔤 http://192.168.0	.74:7777/cgi-bin/login.cgi		v	Google						
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				Configuration						
	OpenVPN server configuration									
	Port :	1701		TCP port to listen on						
Status	VPN compression :	Disable 🗸		Choose compression						
System	Client mode :	Roadwarrior 👻		Choose mode						
Network	OpenVPN bridge IP :	10 . 3 . 0 . 126	Establish connection to website							
Services	Start IP address range :	Start IP address range : 10 . 3 . 0 . 1								
General Proxy	End IP address range :		IP address pool							
Firewall and NAT OpenVPN	Subnet mask :	255 . 255 . 255 . 0		Subnet mask						
Keep alive	Server key modification :	Fri Jun 27 12:21:55 2008	Info	Currently used server key						
Logout	Server certificate modification :	Fri Jun 27 12:21:55 2008	Info	Currently used server certificate						
	Root CA certificate modification :	Fri Jun 27 12:21:45 2008	Info	Currently used root CA certificate						
	Diffie hellman parameters modification :	Fri Jun 27 12:40:09 2008	Info	Currently used diffie hellman parameters						
	OpenVPN create certificates									
	Create root CA key and certificate :									
	Create server key and certificate :									
	Create diffi hellman parameters :		Create							
	Create client key and certificate :	Key and Cert 1 💌	Create	Click to create desired client key and cert.						
	Open\/DN export certificates									
	Export root CA certificate :		Root CA	Click to download						
	Export client 1 key and certificate:	I Valid Key	1 Cert 1 Info	Click to download						
© 2007 SSV				OK Apply Cancel						
			•	Internet						



- **14. Step**: We have now the three pre-build certificate files from the ADNP/9200 OpenVPN installation within the PC directory **c:\Program Files\OpenVPN\config**. Please logout from the ADNP/9200 web interface.
- **15. Step**: Click with right mouse button to the OpenVPN GUI item within the Windows system tray. Then select the **Connect** menu item.



• **16. Step:** Your PC creates an OpenVPN link to the ADNP/9200. A window shows the creation steps and the status/error messages.

Some and the second sec		×
Current State: Connecting		
Thu Jul 03 14:08:23 2008 Data Channel Decrypt: Cipher 'BF-CBC' initialized with 128 bit key Thu Jul 03 14:08:23 2008 Data Channel Decrypt: Using 160 bit message hash 'SHA1' for HMAC authentica Thu Jul 03 14:08:23 2008 Control Channel: TLSv1, cipher TLSv1/SSLv3 DHE-RSA-AES256-SHA, 1024 bit Thu Jul 03 14:08:23 2008 [server] Peer Connection Initiated with 192.168.0.74:1701 Thu Jul 03 14:08:24 2008 SENT CONTROL [server] 'PUSH_BEDUEST' (status=1)	~	
Thu Jul 03 14:08:24 2008 PUSH: Received control ressage: 'PUSH_REPLY,route-gateway 10.3.0.126,pin Thu Jul 03 14:08:24 2008 OPTIONS IMPORT: timers and/or timeouts modified Thu Jul 03 14:08:24 2008 OPTIONS IMPORT:ifconfig/up options modified Thu Jul 03 14:08:24 2008 OPTIONS IMPORT:ifconfig/up options modified		
Thu Jul 03 14:08:24 2008 CF110N3 IMPORT: Totale options moduled Thu Jul 03 14:08:24 2008 TAP-WIN32 device [LAN-Verbindung 7] opened: \\.\Global\{5D5B749E-9B5D-4 Thu Jul 03 14:08:24 2008 TAP-Win32 Driver Version 8.4 Thu Jul 03 14:08:24 2008 TAP-Win32 MTU=1500		
Thu Jul 03 14:08:24 2008 Notified TAP-Win32 driver to set a DHCP IP/netmask of 10.3.0.1/255.255.255.0 Thu Jul 03 14:08:24 2008 Successful ARP Flush on interface [2] {5D5B749E-9B5D-4DAC-AF77-BC35151C Thu Jul 03 14:08:24 2008 TEST ROUTES: 0/0 succeeded len=-1 ret=0 a=0 u/d=down Thu Jul 03 14:08:24 2008 Route: Waiting for TUN/TAP interface to come up Thu Jul 03 14:08:25 2008 TEST ROUTES: 0/0 succeeded len=-1 ret=0 a=0 u/d=down Thu Jul 03 14:08:25 2008 TEST ROUTES: 0/0 succeeded len=-1 ret=0 a=0 u/d=down Thu Jul 03 14:08:25 2008 Route: Waiting for TUN/TAP interface to come up		
	~	
Disconnect Reconnect Hide		

• **17. Step**: The OpenVPN link between your PC and the ADNP/9200 creates a new (virtual) IP network interface on your PC. The name is "**TAP-Win32** ..." (in this sample **TAP-Win32 Adapter V8**). The ADNP/9200 supplies this interface with an IP address (in this case **10.3.0.1**).

ping 10.3.0.126





• **18.** Step: Check the VPN connection between the PC and the DIL/NetPC ADNP/9200 with a simple ping. The IP address of the ADNP/9200 within this VPN is **10.3.0.126**.

🚥 Eingabeaufforderung - 🗆 🗙 C:∖>ping 10.3.0.126 Ping wird ausgeführt für 10.3.0.126 mit 32 Bytes Daten: Antwort von Antwort von 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 Bytes=32 Bytes=32 Bytes=32 Bytes=32 Zeit=5ms Zeit=2ms Zeit=2ms Zeit=2ms 126: 126: 126: 126: 126: ø. Antwort Antwort von von Ping-Statistik für 10.3.0.126: Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust), Ca. Zeitangaben in Millisek.: Minimum = 2ms, Maximum = 5ms, Mittelwert = 2ms C:∖>∎ 1

• **19. Step**: Please try to trace the Ethernet-based link between the PC and the ADNP/9200. Use a simple LAN sniffer (e.g. **Wireshark**) for this task.

First select the "**TAP-Win32** ..." interface for your LAN sniffer. This trace will show the ICMP traffic.

Then select the Ethernet LAN interface of your PC. This trace will show only some UDP traffic



between your PC and the ADNP/9200 UDP port 1701. UDP is the tunnelling protocol for this VPN. The traffic within a UDP packet is encrypted by OpenVPN.

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	3	0.00	2606	10.1	3.0.1	26		10	0.3.0).126			ICM		the (ping) request	4
	5	0.99	0860	10.3	3.0.1	20		10	0.3.0).126			ICM	PE	ho (ping) request	
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	8	1.99	3887	10.3	3.0.1	26		10	0.3.0	0.1			ICM	PE	ho (ping) reply	
	-9	2.99	0946	10.1	3.0.1			10	0.3.0).126			ICM	PE	no (ping) request	
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🕀 In	ter	net	Proto	col.	src:	10.3	3.0.1	. (10		0.1).	Dst	: 10	.3.0	.126	(10.3.0.126)	
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Please note: In next screen shot the IP address 192.168.0.74 is used by the ADNP/9200 as an OpenVPN server. IP address 192.168.0.248 is assigned to the PC as the OpenVPN client.

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2 0.000176 192.168	8.0.248 192.168.0.74 UDP Source port: 1582 Destination port: 12tp	
3 0.155926 192.168	8.0.248 192.168.0.74 UDP Source port: 1582 Destination port: 12tp	
4 0.138399 192.188	8.0.74 192.168.0.248 UDP Source port: 1210 Destination port: 1362	
6 1.153229 192.168	8.0.74 192.168.0.74 UDP Source port: 12to Destination port: 12tp	
7 2.150387 192.168	8.0.248 192.168.0.74 UDP Source port: 1582 Destination port: 12tp	
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9 3.150388 192.168	8.0.248 192.168.0.74 UDP Source port: 1582 Destination port: 12tp	
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11 7.943668 0000000	01.08000997C 00000001.ttttttttt IPX SA General Response	
12 7.943764 0000000	UI.UUU854U4C UUUUUUUI.TTTTTTTTT IPX RI Response	
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∃ Frame 3 (151 bytes on wi	dre, 151 bytes captured)	
🗄 Ethernet II, Src: Samsun	ngE_02:dc:5e (00:13:77:02:dc:5e), Dst: 02:80:ad:20:c4:02 (02:80:ad:20:c4:02)	
Internet Protocol, Src: :	192.168.0.248 (192.168.0.248), Dst: 192.168.0.74 (192.168.0.74)	
I User Datagram Protocol.	Src Port: 1582 (1582), Dst Port: 12tp (1701)	
Data (109 bytes)		
0020 00 <u>4</u> a 06 2e 06 a5 00	0 75 <u>77</u> 71 30 ad 86 b6 <u>8</u> 7 51 .Ju wq0q	^
0030 68 fc cd 12 2e bc 63	3 17 fd 4a 60 95 b5 67 fd 94 hcJ`g.	_
0040 00 96 90 40 93 2a C5) SOI CT 81,48 60 44 39 ST 09(8,**=HY?. S 7 26 67 58 62 50 40 52 00 ft	
0060 d0 58 e5 6c 0f f9 46	5 5d 32 92 0c b6 52 5f 1f 6e .x.l.Fl 2R.n	
0070 1c 87 5b e1 90 54 1c	c 52 ab 61 1a ca 78 83 2f fb[T.Rax./.	~
User Datagram Protocol (udp), 8 bytes	P: 12 D: 12 M: 0 Drops: 0	.:

Please note: For a secure connection to the ADNP/9200 it is also necessary to close the ADNP/9200 Ethernet LAN with the IP address 192.168.0.126 with the help of **Iptables**. Without this step there are two connections between the PC and the ADNP/9200. One over the 192.168.0.0 IP network and the second over the 10.3.0.0 VPN-based network.

That is all.

SSV EMBEDDED SYSTEMS 2008, mHTA9200-17.doc, Rev. 1.00.