Mounting your Physics home directory using SSH for Windows 10

Introduction

This tutorial contains screenshots for the English version of Windows 10.

To be able to mount a Windows share over SSH we will need

- Administrator access to the local computer, including the ability to *elevate* privileges. If you don't know what I am talking about then stop reading right here.
- <u>Tunnelier</u>, which is an excellent and free implementation of SSH for Windows. It is assumed that you are familiar with the Tunnelier user interface.
- One real or virtual network adapter, bound to the *Client for Microsoft Networks* driver. Normally you should already have such an adapter, as otherwise you would not be able to mount any Windows shares.
- One real or virtual network adapter, **NOT** bound to the *Client for Microsoft Networks* driver.

Note that this is slightly different from the requirements for Windows 2000/XP, as with Vista/7 a different protocol driver (SMB) is used compared to the older versions of Windows (Netbios over TCP/IP or CIFS).

This part of the tutorial is split into the following steps:

- 1. As most people do not have a spare real network adapter in their computer, we will add an extra virtual network adapter by <u>installing</u> the **Microsoft Loopback Adapter**.
- 2. After that, the network adapter must be properly <u>configured</u>.
- 3. Furthermore, a Windows system driver needs to be tweaked.
- 4. And we need to create a Task for the Windows Task Scheduler.
- 5. Reboot Windows and verify that all changes were applied successfully.
- 6. Then we set up a special <u>Tunnelier</u> session with the right port-forwarding.
- 7. Finally, we start Tunnelier and <u>mount</u> our Physics home directory.
- 8. For those wishing to <u>undo</u> the above steps follow the instructions at the bottom of this tutorial.

Installing the Loopback Adapter

To install the Loopback adapter follow these steps:

- Start the Add Hardware Wizard by either going Start->Settings->Control Panel->Add Hardware or by starting a console window with elevated (Administrator) privileges. In the console window type
- hdwwiz.exe

The Hardware Wizard will come up:

Add Hardware	
	Welcome to the Add Hardware Wizard
	This wizard helps you install driver software to support older devices that do not support Plug-and-Play and which are not automatically recognized by Windows.
	You should only use this wizard if you are an advanced user or you have been directed here by technical support.
	If your hardware came with an installation CD, it is recommended that you click Cancel to close this wizard and use the manufacturer's CD to install this hardware.
	To continue, click Next.
	< <u>B</u> ack <u>N</u> ext > Cancel

• Click **Next** to continue:

Add Hardware		
The wizard can help you install other hardware		
The wizard can search for other hardware and automatically install it for you. Or, if you know exactly which hardware model you want to install, you can select it from a list.		
What do you want the wizard to do?		
Search for and install the hardware automatically (Recommended)		
Install the hardware that I manually select from a list (Advanced)		
< Back Next > Cancel		

Select Install the hardware that I manually select from a list and click Next.

• Now you'll see:

Add Hardware			
From the list below, select the type of hardware you are installing			
If you do not see the hardware category you want, click Show All Devices.			
Common hardware types:			
Memory technology devices Riracast display devices	^		
Modems			
The most serial adapters			
Network adapters PCMCIA adapters			
Portable Devices			
Ports (COM & LPT) POS Barcode Scanner	U		
g i os barcoac ocannel			
< Back Next >	Cancel		

Select the entry **Network adapters** and click **Next**.

• In the next screen

Add Hardware	
Select the device driver you want	t to install for this hardware.
	I model of your hardware device and then click Next. If you have a you want to install, click Have Disk.
Manufacturer Intel Intel Corporation Mellanox Technologies Ltd. Microsoft	Model ^ Image: Microsoft ISATAP Adapter Image: Microsoft KM-TEST Loopback Adapter Image: Microsoft Teredo Tunneling Adapter Image: Microsoft Teredo Tunneling Adapter Image: Wake on Lan pattern Install Section V
This driver is digitally signed. <u>Tell me why driver signing is imp</u>	Have Disk Cancel

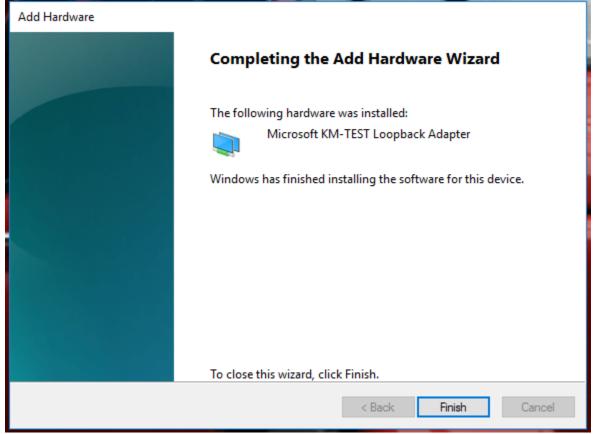
first select **Microsoft** from the list of *Manufacturers* and then select **Microsoft KM-TEST Loopback Adapter** from the list of *Network Adapters*. Finally, click **Next** once more.

• Almost finished:

Add Hardware			
The wizard is ready to install your hardware			
Hardware to install:			
Microsoft KM-TEST Loopback Adapter			
To start installing your new hardware, click Next.			
	< Back	Next >	Cancel

This is your last chance to abort, otherwise, click Next.

• After a while you should see:



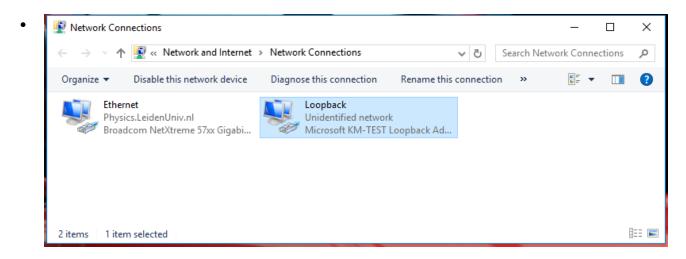
Click **Finish** to exit the Hardware Wizard.

You are now ready to configure your newly installed Loopback adapter. Even though Windows might not ask you to, reboot anyways (heey, it's a Microsoft OS ;-)). Erom reports I've seen on the Internet a reboot is sometimes required for the loopback adapter to

From reports I've seen on the Internet a reboot is sometimes required for the loopback adapter to come up properly.

Configuring the Loopback Adapter

Now that your newly installed loopback adapter is up and running we must configure it properly:



- Choose the loopback adapter (usually it is named "Local Area Connection #3") and rightclick on it. Choose **Rename** and type loopback.
- Then Choose Properties, after which a new window will appear

Ethernet 2 Properties	×			
Networking Sharing				
Connect using:				
Microsoft KM-TEST Loopback Adapter				
<u>Configure</u> This connection uses the following items:				
Client for Microsoft Networks File and Printer Sharing for Microsoft Networks QoS Packet Scheduler Internet Protocol Version 4 (TCP/IPv4) Link-Layer Topology Discovery Mapper I/O Driver Microsoft Network Adapter Multiplexor Protocol Microsoft LLDP Protocol Driver				
Install Uninstall Properties				
Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.				
OK Cancel				

Make sure that

- Only the entry Internet Protocol (TCP/IP) is enabled.
- Select the entry Internet Protocol (TCP/IP), then click on Properties.

• A new window will appear:

Internet Protocol Version 4 (TCP/IPv4)	Internet Protocol Version 4 (TCP/IPv4) Properties				
General					
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.					
Obtain an IP address automatical	У				
• Use the following IP address:					
IP address:	10 . 10 . 10 . 10				
Subnet mask:	255 . 255 . 255 . 🚺				
Default gateway:					
Obtain DNS server address autom	natically				
• Use the following DNS server add	resses:	1			
Preferred DNS server:					
Alternate DNS server:					
Validate settings upon exit	Advanced				
	OK Cance				

Select **Use the following IP address** and fill in the 'IP address' and 'Subnet mask' as above.

It is not necessary to fill in the 'Default gateway' or a 'DNS server'.

Advanced TCP/IP Setti	ngs		>
IP Settings DNS V	VINS		
IP addresses			
IP address		Subnet mask	
10.10.10.10		255.255.255.0	
	Add	Edit	Remove
Default gateways:			
Gateway		Metric	
	Add	Edit	Remove
Automatic metric			
Interface metric:	9999		
		ОК	Cancel

• Click on **Advanced** to make the following window appear:

Deselect **Automatic metric** and fill in the value of **9999** as the 'Interface metric' as shown above.

• Click on the **WINS** tab:

Advanced TCP/IP Settings	\times
IP Settings DNS WINS	
WINS addresses, in order of use:	
	t
	1
Add Edit Remove	
If LMHOSTS lookup is enabled, it applies to all connections for which TCP/IP is enabled.	
Enable LMHOSTS lookup Import LMHOSTS.	
NetBIOS setting	
O Default:	
Use NetBIOS setting from the DHCP server. If static IP addre is used or the DHCP server does not provide NetBIOS setting enable NetBIOS over TCP/IP.	
O Enable NetBIOS over TCP/IP	
Disable NetBIOS over TCP/IP	
ОК Са	ancel

and select Disable NetBIOS over TCP/IP.

- Click on **OK**.
- You are now back in the main 'TCP/IP Properties' screen. Click OK again.
- You are now back in the main 'Loopback Properties' screen. Click Close.

Tweaking the 'SMB' driver

Now we first need to tweak a Windows system driver to overcome the thing that Microsoft broke. The root cause of the problem is that we need to access the file share using TCP port **445**. However, when Windows 10 boots this port is grabbed by the system smb driver for all interfaces. By delaying the startup of the smb driver and by installing a portproxy rule we can circumvent this. This section explains how to do this:

- Start a console window with elevated (Administrator) privileges.
- First, we disable the automatic starting of the smb driver:
- sc config LanmanServer start= demand

NOTE the space after the start= !

- Next we add a portproxy rule to reroute TCP port 445 to a port of our choosing. For this tutorial, I choose **44445**:
- netsh interface portproxy add v4tov4 listenaddress=10.10.10.10 listenport=445 connectaddress=10.10.10.10 connectport=44445

IMPORTANT NOTES:

- The listenaddress is the address of the Loopback adapter configured in the section earlier
- o The connectaddress must be identical to the listenaddress
- o Using listenaddress=127.0.0.1 does not work. Believe me, I've tried.

If all went well you should see something like

Administrator	: Command Pror	mpt		-		×
	C:\Windows\system32>sc config LanmanServer start= demand [SC] ChangeServiceConfig SUCCESS					Â
C:\Windows\sy 0.10 connectp		h interface portp	oxy add v4tov4 listenaddress=10.10.10.10 listenport=445 connecta	ldress	5=10.1	.0.1
C:\Windows\sy	stem32≻nets	h interface portp	oxy show v4tov4			
Listen on ipv	4:	Connect to ip	4:			
Address	Port	Address	Port			
10.10.10.10	445	10.10.10.10	44445			
C:\Windows\sy	stem32>					
						~

The portproxy rule is persisent, so there should be no need to repeat this step after a reboot.

Creating a task to start the 'SMB' driver

Of course, now that we have disabled the automatic startup of the 'SMB' driver we need to start it manually when Windows comes up, or rather, when a user logs in. For this we use the Vista/7 Task Scheduler:

• Start the 'Task Scheduler' from the 'Administrative Tasks' menu:

• Click on 'Create Basic Task' to use the Task Wizard. A new window will come up:

Create Basic Task Wizard			×
Create a Basic Task			
Create a Basic Task Trigger	Use this wizar such as multi	d to quickly schedule a common task. For more advanced options or settings ple task actions or triggers, use the Create Task command in the Actions pane.	
Action	Name:	Start SMB driver	
Finish	Description:		
		< Back Next > Cance	

Enter the name of the task, e.g. **Start SMB driver** and click **Next**.

• Choose an event to trigger the execution of the task. We will change this later on, so for now, choose **When I log in**:

Create Basic Task Wizard	×	(
迿 Task Trigger		
Create a Basic Task	When do you want the task to start?	
Trigger	O Daily	
Action Finish	O Weekly	
	O Monthly	
	○ One time	
	○ When the computer starts	
	When I log on	
	○ When a specific event is logged	
	< Back Next > Cancel	

and click Next.

• Next we need to choose the type of action:

Create Basic Task Wizard				×
Action				
Create a Basic Task Trigger Action	What action do you want the task to perform?			
Finish	Start a program			
	 Send an e-mail (deprecated) 			
	 Display a message (deprecated) 			
-				
-				
		< Back	Next >	Cancel

Select the entry **Start a program** and click **Next**.

• Fill in the details of the program we want to start:

Create Basic Task Wizard				×
Start a Program				
Create a Basic Task				
Trigger	Program/script:			
Action	c:\windows\system32\svhost.exe		E	Browse
Start a Program Finish	Add arguments (optional):		-k netsvcs	
	Start in (optional):			
		< Back	Next >	Cancel
• The Program is 'c:	:\windows\system32\svhost.exe	•		

The Program 1s c:\windows\sy
The Arguments are '-k netsvcs'

Then click **Next** to continue.

• Before clicking 'Finish' first select the tickbox 'Open the properties dialog':

Create Basic Task Wizard		×
Summary		
Create a Basic Task		
Trigger	Name:	Start SMB driver
Action	Description:	
Start a Program		
Finish		
	Trigger:	At log on; At log on of PHYSICS\Kuyvenhoven
	Action:	Start a program; c:\windows\system32\svhost.exe -k netsvcs
	🗹 Open the	Properties dialog for this task when I click Finish
	When you cli	ck Finish, the new task will be created and added to your Windows schedule.
		< Back Finish Cancel

and then click Finish.

• In the 'Task Properties' window select **Run whether user is logged on or not**, then select **Do not store password**. After that, also select the tickbox **Run with highest privileges**:

🕒 Start SMB dr	iver Properties (Local Computer)	\times
General Trigg	gers Actions Conditions Settings History	
Name:	Start SMB driver	
Location:	N N	
Author:	PHYSICS\Kuyvenhoven	
Description:		
Security opti	ons	
When runni	ng the task, use the following user account:	
Kuyvenhove	en Change User	
O Run only	when user is logged on	
Run whe	ther user is logged on or not	
🗹 Do n	ot store password. The task will only have access to local computer resources.	
🗹 Run with	highest privileges	
🗌 Hidden	Configure for: Windows Vista™, Windows Server™ 2008	\sim
	OK Cancel	

Do **NOT** click 'OK' just yet, but go to the 'Triggers' tab, then double-click the 'At log on' trigger to edit it.

• In the 'Edit Trigger' window change the setting 'Specific user or group' to Any user:

🖳 Edit Trigger					Remark Saltra	23
Begin the task: Settings	At log on				•	
Any user						
Specific user or g	group: glau	urung\janjust			Change User or Group	
Advanced settings						
Delay task for:		15 minutes	T			
Repeat task every	r:	1 hour	-	for a	duration of: 1 day	·]
Stop all runn	ing tasks at en	nd of repetition d	uration			
Stop task if it run	s longer than:	3 (days	-		
Activate: 0	2/08/2010	16:12:55	×.		Synchronize across time zones	5
Expire: 0	2/08/2011	16:12:55	· · · · · · · · · · · · · · · · · · ·		Synchronize across time zones	5
V Enabled						
					OK Cance	el

then go to the 'Conditions' tab:

• In the 'Conditions' window make sure the setting 'Start the task only if the computer is on AC power' is NOT set:

StartSMB Properties (Local Computer)		×
General Triggers Actions Conditions Settings Histor	Ŋ	
Specify the conditions that, along with the trigger, determ run if any condition specified here is not true.	ine whether the task should run. The task will not	
Idle		
Start the task only if the computer is idle for:	10 minutes 👻	
Wait for idle for:	1 hour 👻	
✓ Stop if the computer ceases to be idle		
Restart if the idle state resumes		
Power		
Start the task only if the computer is on AC power		
Stop if the computer switches to battery power		
Wake the computer to run this task		
Network		
Start only if the following network connection is available	ble:	
Any connection		
	OK Cancel	

and then click OK.

The task is now configured. Close the Task Scheduler.

Reboot and verify

Of course, now that we have disabled the automatic startup of the 'SMB' driver we have to reboot Windows before proceeding.

- After Windows comes up and you have logged in, check the status of the 'SMB' driver. Open a command console (no privilege elevation is required) and type
- sc query LanmanServer

The SMB driver should be in the state **Running**.

- Verify that the portproxy was applied successfully by checking the open ports on the system. Type in the command console
- netstat -an | find ":445 "

You should see something like

TCP 10.10.10.10:445 0.0.0.0:0 LISTENING

If you see '0.0.0.0:445' instead then the 'portproxy' rule was not applied correctly.

Configuring Tunnelier

•

Set up a special Tunnelier session with the appropriate port-forwarding:

• Start Tunnelier and configure it as the screenshots

🛒 Bitvise SSH Clier	nt 4.51
Profile: (defau	ılt profile)
Load profile Coad profile Save profile as	Login Options Terminal Remote Desktop SFTP Services C2S S2C SSH About Server Host ish3,physics.leidenuniv.nl Username kuyvenhoven Initial method password Initial method password Initial method password Initial method password Imitial method
	Login

🚿 Bitvise SSH Clie	nt 4.51
Profile: (defa	ult profile)
Load profile Save profile as	Login Options Terminal Remote Desktop SFTP Services C2S S2C SSH About Reconnection Automatically reconnect if Successful connection breaks Always reconnect automatically Never reconnect automatically Rever reconnect automatically Rever reconnect in timeout Show authentication banner automatically Capout when session activity is over Logout when session activity is over Help Options Capout when session activity is over Help Options Capout when session activity is over Help Options Capout when session activity is over Help Options Capout when session activity is over Help Options Capout when session activity is outing the set of the s
	Login

3 Bitvise SSH Client Profile: (defaution)	ult profile)			1.000 1.0			
	Login Op	tions Terminal R	emote Deskto	p SFTP Ser	vices C2S	S2C SSF	H About
Load profile	Status	Listen Interface	List. Port	Destination Ho		Dest. Port	Comment
2	enabled	10.10.10.10	44445	file3.physics.l	eidenuniv.nl	445	
Save profile as							
	•						
	Add	Edit	Remove	Accep	ot server-side p	ort forwarding	ıs <u>Help</u>
	109:00:31 109:00:31	331 Bitvise SSH Cl Copyright (C) Portions Copy 331 Visit www.bitv 331 Run 'BvSsh -h 463 Loading defau	2000-2012 by right (C) 1995 ise.com for lat elp' to learn th	Bitvise Limited. -2003 by Wei D test information	ai. about our SSH	-	

Putting it all together

Now that we have configured both our loopback adapter and Tunnelier we can put it all together and mount our Physics home directory as a Windows share:

- Start your newly created Tunnelier session and login on
- Make sure port-forwarding is working properly by checking the Tunnelier event log.. You should see a log similar to:

	nt - ssh3.physics.leidenuniv.nl:22
Profile: (defau	un prome)
A	Login Options Terminal Remote Desktop SFTP Services C2S S2C SSH About
	Server
Save profile as	Host ssh3.physics.leidenuniv.nl Username kuyvenhoven
<u> </u>	Port 22 Initial method password
	Proxy settings Host key manager
Bitvise SSH Server Control	Password
Panel	SPN
	SSPI/Kerberos 5 Delegation User keypair manager
2	✓ Try gssapi-keyex first if available
New terminal	
console	
2	Help
	09:00:31.463 Loading default profile.
New SFTP window	(1)09:12:56.401 Starting a new SSH2 session.
window	(1)09:12:56.402 Connecting to SSH2 server ssh3.physics.leidenuniv.nl:22.
90	(1)09:12:56.416 Connected.
New Remote	09:12:56.521 Starting first key exchange.
Desktop	09:12:56.521 Server version string: SSH-2.0-OpenSSH_5.3
	(i)09:12:56.543 New host key received. Algorithm: ssh-rsa, Size: 2048 bits, MD5 Fingerprint: 65:05:df:8f:28:98:ef:0b:71:44:2c:fc:cf:9c:0e:c3, Bubble-Babble: xuhag-lovih-cezem-kedel-tykop-tusom-nelul-dipog-mivyv-gisob-raxex.
	(j)09:13:04.848 Host key saved successfully.
	09:13:04.853 First key exchange completed.
	(1)09:13:04.861 Key exchange: diffie-hellman-group14-sha1. Session encryption: aes256-ctr, MAC: hmac-sha1, compression: none.
	(i)09:13:04.862 Attempting 'password' authentication.
	09:13:04.884 Authentication completed.
	09:13:04.885 Initializing client-side client-2-server forwarding on 10.10.10.10:44445 succeeded.
	Logout Exit

If not, then check your Tunnelier session options first.

Mapping a network drive

To make life even easier it might be handy to map a network drive to your Physics home directory:

• Start Windows Explorer and choose **Tools->Map Network Drive**.

• In the next screen, fill in:

•

in the same little		×
🌀 🤏 Map N	Network Drive	
	etwork folder would you like to map? The drive letter for the connection and the folder that you want to connect to:	
Drive: Folder:	Y: \\10.10.10\homes\$\kuyvenhoven Example: \\server\share Image: Reconnect at logon Image: Connect using different credentials Connect to a Web site that you can use to store your documents and pictures.	
	Finish	ncel
 Do NO² \\10.10.2 Do NO² 	an available drive letter. T click on <i>Browse</i> but type in as the <i>Folder</i> name: 10.10\homes\$\ <your-physics-userid> T click on <i>Finish</i>, click on Different user name. een, fill in your Physics-Windows userid: y</your-physics-userid>	
	vork Password ssword to connect to: 10.10.10.10	
	physics\kuyvenhoven Password Domain: physics Image: Comparing the second	
	OK Cancel	

For the User name, fill in the domain **Physics**\ followed by your Physics-Windows

userid.

For the *Password*, fill in your Physics-Windows password and press **OK**.

- Click on **Finish** to complete the network drive mapping.
- You should now see a new drive letter appear in the *Folders* tree-list in Windows Explorer. Click on it to verify that you are indeed viewing your Physics home directory.

Control+Z! Undo! Undo!

For those wishing to undo the CIFS-over-SSH trick follow these steps:

- 1. Start a console window with elevated (Administrator) privileges.
- 2. Restore the automatic startup of the smb driver by typing
- 3. sc config LanmanServer start= auto

NOTE the space after the start= !

- 4. Remove the portproxy rule by typing
- 5. netsh interface portproxy delete v4tov4 listenaddress=10.10.10.10 listenport=445
- 6. Start a Device Manager by typing
- 7. devmgmt.msc

Expand the 'Network Adapters', right-click on Loopback adapter and select Uninstall.

8. Use the 'Task Scheduler' from the 'Administrative Tasks' menu to delete the task 'Start SMB driver'