
DESY
IT

Secure access to the DESY network using SSH

UCO @ DESY

November 29, 2007, Hamburg

Contents

1 General Information

This documentation is part of a wide collection of documentations available at **UCO** (User Consulting Office). Please read carefully and feel free to ask questions.

1.1 How to reach UCO

Feel free to call for support or come along:

Location	Phone	Room
Hamburg	040/8998 5005	Building 2b, Room 131d
Zeuthen	030/3762 7324	Building 1R, Room 21

2 Introduction

This document is intended to guide you in setting up secure connections to DESY's network over the Internet. To accomplish this, SSH is used as a protocol. SSH allows for an encrypted peer-to-peer connection running through any amount of relay stations for transferring commands and files. In addition to that SSH can be used to create tunnels for encapsulating and encrypting data packets of any TCP-based protocol into the SSH connection's stream. A listing of common protocols and their assigned default ports can be found on **page 17**.
ATTENTION: Please remember that SSH encryption obfuscates your traffic **only** from your machine to the gateway server. Further encryption behind the gateway server depends on the protocol you are using.

DESY Hamburg and Zeuthen are using special servers for you to connect to and tunnel through.

Location	Server
Hamburg	bastion.desy.de
Zeuthen	pub.ifh.de

Terminal-Server (Windows-RDP-Server) at DESY by location (must be enabled for each account by UCO):

Location	Server
Hamburg	adterm.win.desy.de
Zeuthen	znformica.ifh.de

3 Coming from Windows

This document is intended to help Windows users accessing remote services at DESY as well as anywhere else and uses the very powerful SSH client implementation **PuTTY**[1] since it simplifies handling of tunnels and is Open Source Software.

3.1 Basic configuration of PuTTY

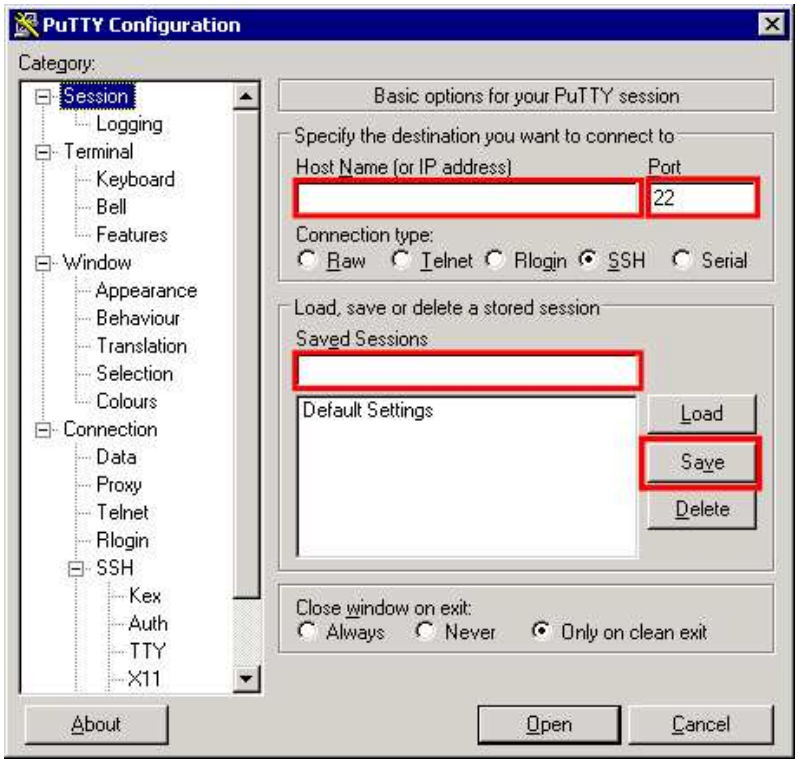


Figure 1: **PuTTY settings** (server configuration)

Parameter	Value
Host Name	bastion.desy.de or pub.ifh.de
Port	22
Protocol	SSH

You can save your settings by assigning it an arbitrary name and clicking **Save after** having set all needed options. Please configure needed tunnels **before** saving. After this step a tunnel has to be configured. It should run through the server specified under **Host Name** and connect you to a computer inside the DESY network.
Provide the following settings under **Connection→SSH→Tunnels**:
Set **YYYYY** to a free port m(→ page 17) on **localhost** and set **ZZ** to the desired

[1] http://en.wikipedia.org/wiki/PuTTY

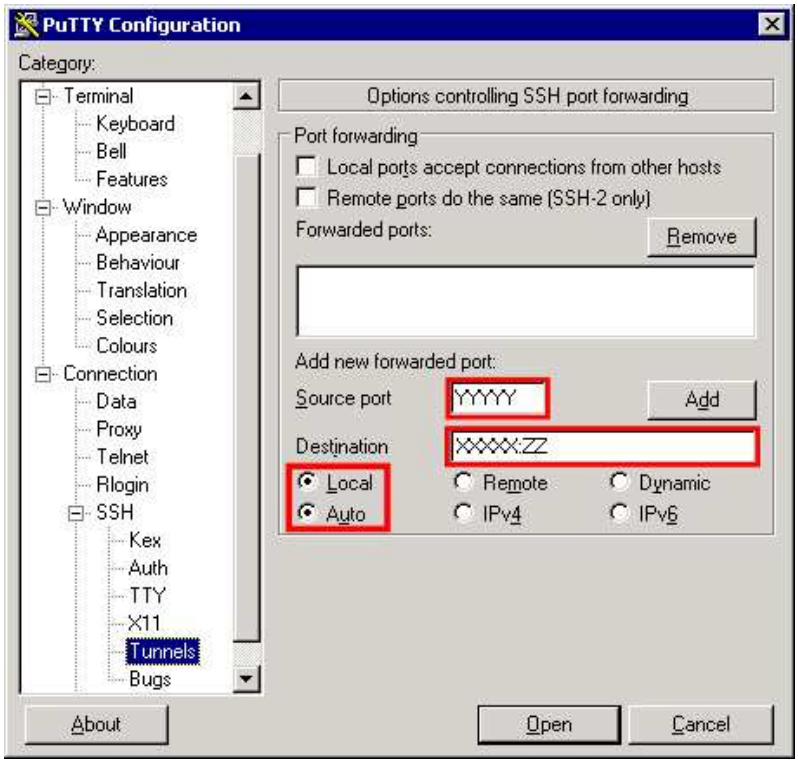
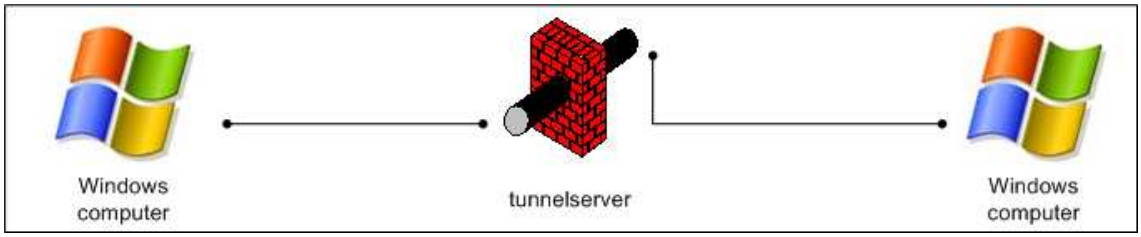


Figure 2: **PuTTY settings** (tunnel configuration)

service's port on remote machine. **YYYYY** will pose as the tunnel's local end between **XXXXX:ZZ** and localhost. Click on ADD. **Open** starts a shell where authentication is needed.
Attention: The shell has to remain open during the whole session in order for the tunnel to stay alive.

3.2 Remote Desktop (Target OS: Windows)



Windows' **Remote Desktop**[2] service uses **port 3389** by default. Set **ZZ** in **Fig. 2** to **3389**. You can use the Terminal Server (→ **page 5**) if you don't want to connect to another specific machine.. You can now start the RDP tool: **Start** → **Run** → **mstsc.exe**

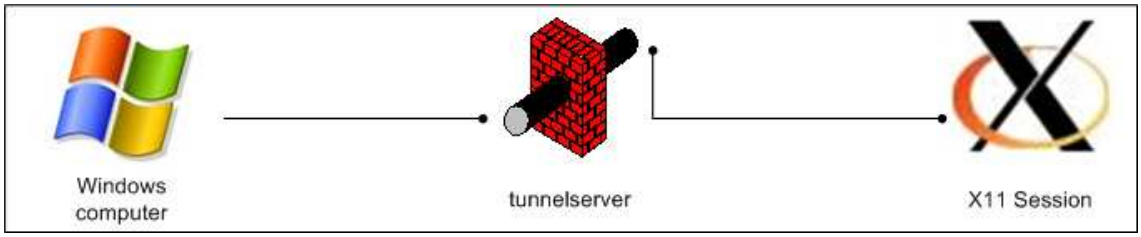
Figure 3: **Establishing a Remote Desktop session** (server configuration)

Parameter	Value
YYYYY	any

Attention:
You have to be in the access list for Remote Desktop users. This can be achieved as follows:
Right click on **My Computer** → **Properties** → **RemoteCheck** → **Allow user to connect remotely to this computer** → **Select Remote Users** → **Add** → enter **UserID** → **OK** → **OK**

[2] http://www.microsoft.com/windowsxp/using/mobility/getstarted/remoteintro.mspx

3.3 X11 (Target OS: UNIX/Linux)



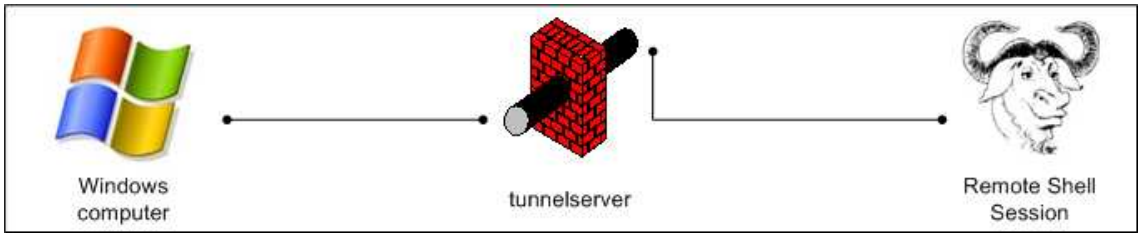
Set **ZZ** in **Fig. 2** to **22**. An X-Server has to be installed on the target machine (e.g. Xfree86, Xorg).

The terminal server (**page 5)** has **X-Win32** preinstalled and can be used alternatively. Please adjust the entry **Destination** in **Fig. 2** to look like this: **[Terminal server]:3389**

Open **X-Win32** after successful installation and start the Interface by left-clicking on the X-Win32 icon next to Windows' clock.

Wizard → Enter name → StarNetSSH → Enter hostname (localhost) → enter Login & password → choose target → Finish

3.4 Remote Shell (Target OS: UNIX/Linux/MacOS X)



The easiest way to access a remote shell service behind gateway server is to create a local proxy using PuTTY.
Set Hostname in **Fig.1** to the shell server **behind** the gateway. Provide the following settings under **Connection → Proxy**:

Parameter	Value
Proxy type	**local**
Telnet command or local proxy command	plink -l UserID **tunnelserver** -nc %host:%port This only works if you are using key authentication! See **page 19**

Set **tunnelserver** according to the table on **page 5**.

3.5 Transferring files (Target OS: Windows)

You can access your DESY network drives via the Remote Desktop Protocol. The neccessary steps are as follows:
Follow **Chapter 2.2** and in the dialog shown in **Fig. 3** click on **Options** → **Local Ressources** → under **Local Devices and Ressources** → **More...** click on the plus sign next to **Drives** → select the needed local drive → **OK** → **Connect**

3.6 Transferring files (Target OS: UNIX/Linux/MacOS X)

WinSCP[3] is a useful tool for file transfer and management between UNIX hosts and Windows clients.

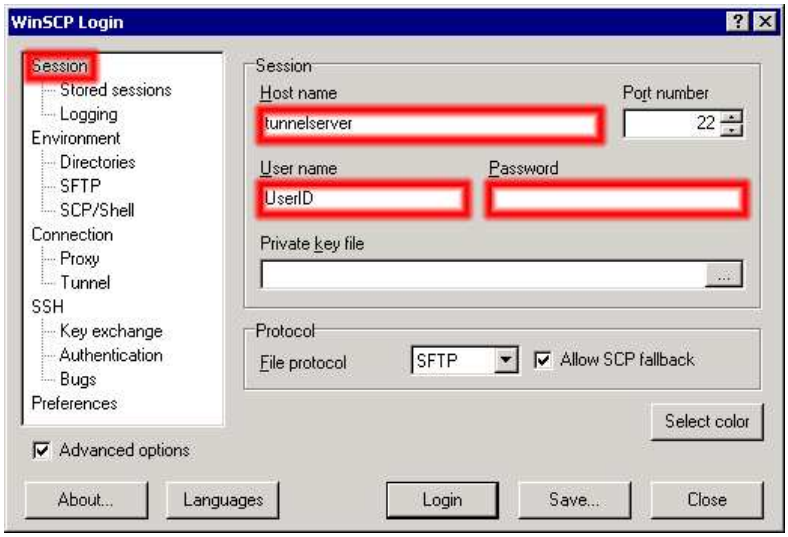


Figure 4: **Establishing an SFTP/SCP session** (Windows)

Please set up the following parameters.

Parameter	Value	Description
Host name	**page 5**	Server to tunnel through
User name	Your DESY UserID	
Private key file	Your private key (.ppk)	See page 19

[3] http://winscp.net/eng/index.php

Now go to **Connection** → **Tunnel** and set up this:

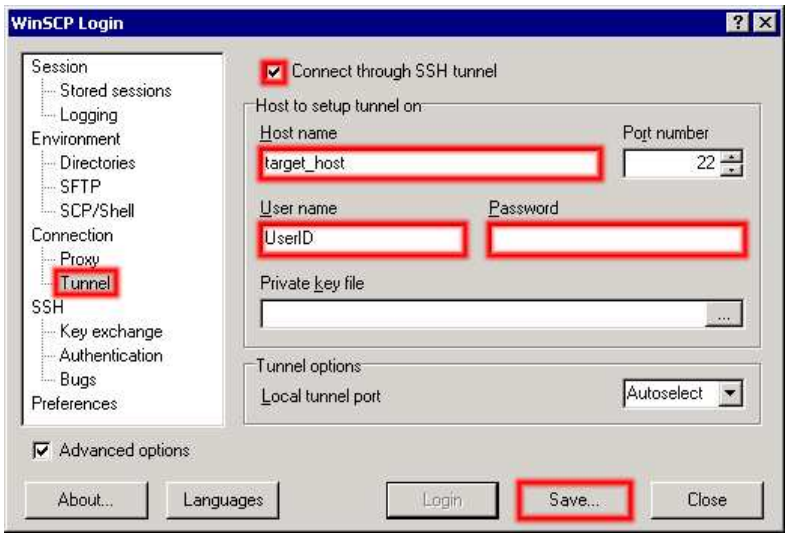


Figure 5: **Establishing a tunnelled SFTP/SCP session** (Windows)

Don't forget to enable the option **Connect through SSH tunnel**

Parameter	Value	Description
Host name	any SSH-enabled machine	The remote end of the tunnel
User name	Your DESY UserID	

If you want to keep the settings saved for later use click on **Save** and enter an appropriate connection name.

4 Coming from UNIX/Linux

Most UNIX/Linux distributions are equipped with an SSH implementation like OpenSSH[4] by default. The syntax for creating a tunnel is as follows:

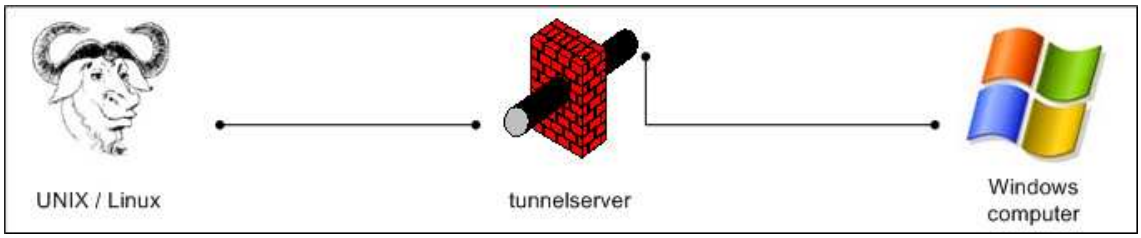
```
ssh -C -L localport:remote_server:remote_port -l username tunnelserver
```

-C compresses the transmitted data and helps keeping bandwidth usage low.
-L is the parameter to create a tunnel.

The standard parameters:

Parameter	Value	Description
localport	any **(above 1024 if not created by root)**	**Tunnel's end on your computer**
remote_server	Arbitrary computer behind **tunnelserver**	**Tunnel's target**
username	Your DESY UserID	
tunnelserver	bastion.desy.de **or** pub.ifh.de	**Server through which the connection gets tunneled**

4.1 Remote Desktop (Target OS: Windows)



For accessing an RDP session open a shell, create a tunnel as shown on **page 12** with `remote_port` being set to **3389** and connect to it using the following line:

```
rdesktop -g resolution -a color_depth -n localhost:localport
```

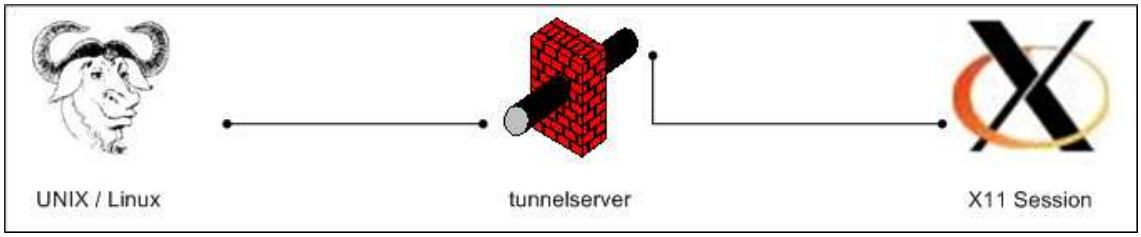
Please use the following settings:

Parameter	Value	Description
resolution	800x600, 1024x768, etc.	Screen resolution in pixels
color_depth	8,16	Color resolution in bits

Reduction of resolution and color depth lowers bandwidth usage and is advisable on slow Internet connections.

[4] http://www.openssh.com/

4.2 X11 (Target OS: UNIX/Linux)

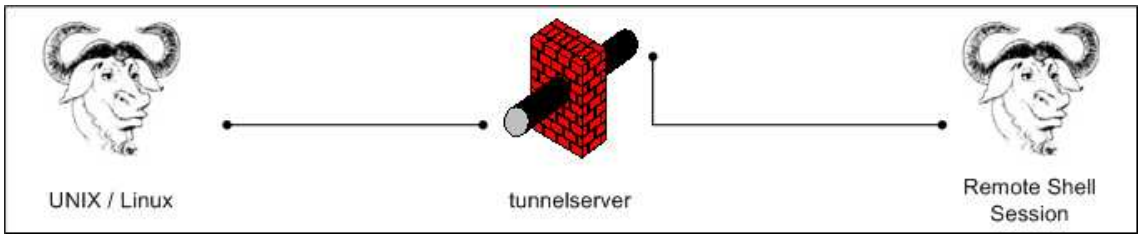


Forwarding SSH connections is accomplished as follows:

```
ssh -C -X -L localport:remote_server:remote_port -l username tunnelserver
```

-X activates the forwarding of X11 sessions. Provided you are running **xterm** you can start arbitrary GUI programs after issuing the SSH command.

4.3 Remote Shell (Target OS: UNIX/Linux/MacOS X)



There are two options for connecting to a shell behind `tunnelserver`.

- Using two seperate SSH-sessions (quick and dirty)
  Please use the following setting:

Parameter	Value	Description
remote_port	22	Port for SSH

  After having established the SSH tunnel you have to connect to the tunnel's local end using a second SSH session..

- Using a static configuration file (slow and clean)
  Please edit the file `~/.ssh/config` and add the following lines for each `target_machine` on which you require shell access.

  ```
  Host target_machine
  ProxyCommand ssh bastion.desy.de netcat -w 3 target_machine 22
  ```

4.4 Transferring files (Target OS: UNIX/Linux/MacOS X)

gFTP[5] offers both FTP and SCP/SFTP connections.

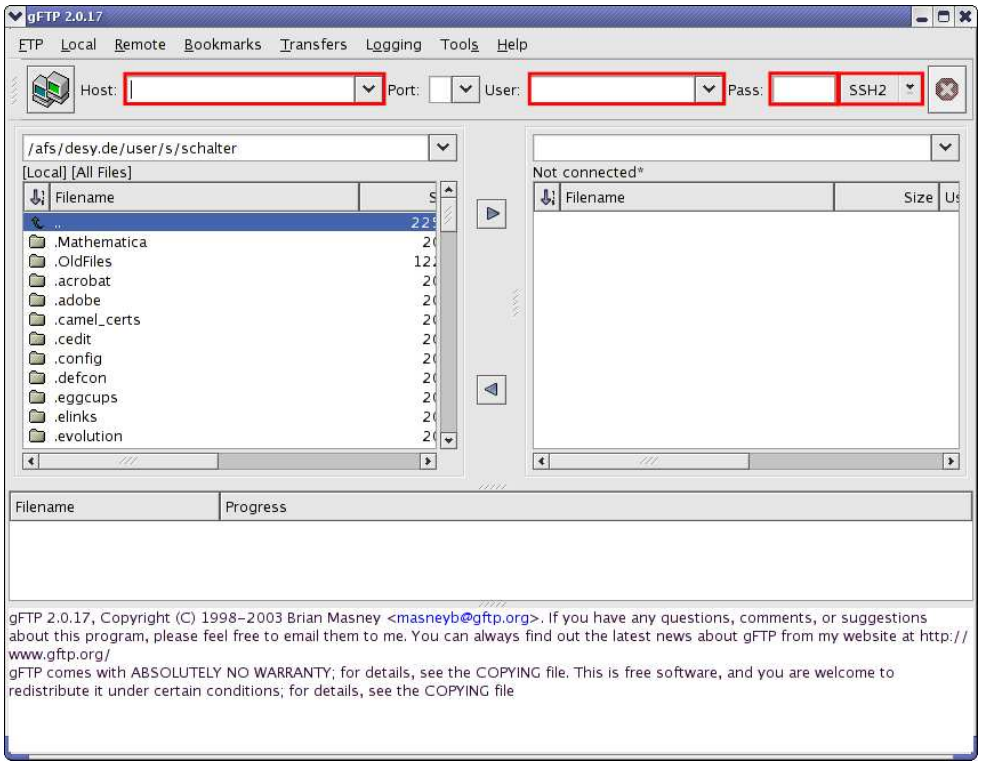


Figure 6: Establishing an SFTP/SCP session (UNIX/Linux)

Parameter	Value	Description
Host	**page 5**	Server through which the connection gets tunneled
User	Your DESY UserID	
Passwort	Your DESY password	
Mode	SSH2	

[5] http://gftp.seul.org/

4.5 Single-Sign-On login (Target OS: UNIX/Linux/MacOS X)

You can set up the file `~/.ssh/config` to allow Single-Sign-On login. This means that you will have to authenticate just once and not on every single system you connect to. Add this to the beginning of the file

```
Host *
ControlMaster auto
ControlPath /tmp/master-%r@%h:%p
```

Please attach the following template for every host you want to connect to:

```
Host target_machine
Hostname target_hostname
User UserID
ProxyCommand ssh UserID@bastion.desy.de netcat -w3
```

Parameter	Value	Description
target_machine	any	target host name without its domain
target_hostname	any	target host name with its domain
UserID	Your DESY UserID	

5 SSH-Proxy

Using an SSH proxy can provide usability benefits. An SSH proxy allows you to tunnel any protocol through it. This allows you to relay the traffic of every **SOCKS-proxy**[6] aware application through an SSH encrypted machine. You will need to have access to a remote SSH server for this to work. Use this if you connect to untrusted networks (e.g. in internet cafes) to read your mail, etc.
ATTENTION: You will have to setup the newly created Proxy running on `localhost:localport` in the proxy settings configuration of each application that is supposed to use it. The syntax for creating a tunnel **on the client's side** is as follows:

```
ssh -C -D localport -l username tunnelserver
```

-C compresses the transmitted data and helps keeping bandwidth usage low.
-D is the parameter to achieve proxy forwarding.

Parameter	Value	Description
localport	any **(above 1024 if not created by root)**	**SOCKS5 compatible proxy port on the local machine**
username	Your DESY UserID	
tunnelserver	**page 5**	**Server through which the connection gets tunneled**

`tunnelserver` can be any reachable system running an SSH daemon. Please note that you need to have an account on `tunnelserver` before trying this.

[6] http://en.wikipedia.org/wiki/SOCKS

6 Ports

Ports are endpoints of connections between networked services. Each machine manages up to 65536 ports. The first 1024 ports cannot be used by any user except root. The port number is not neccessarily linked to a particular service, i.e. you can use other ports than the default ones for services. However, sticking to the default port usage scheme can ease usability significantly.

6.1 Common ports

A small collection of commonly used ports.

Port Number	Service	Port Number	Service
20, 21	FTP	**993**	IMAPS
22	SSH	**995**	POP3S
88	Kerberos	**3389**	RDP
389	LDAP	**3389**	RDP
515	LPD	**5800, 5900**	VNC

6.2 Free local ports

How to determine free ports

6.2.1 Windows

Open a shell using Start / Run / cmd

```
C:\>netstat -an

Active Connections
Proto  Local Address Foreign Address State
TCP    xxx.xxx.xxx.xxx:135 xxx.xxx.xxx.xxx:0 LISTENING
TCP    xxx.xxx.xxx.xxx:445 xxx.xxx.xxx.xxx:0 LISTENING
TCP    xxx.xxx.xxx.xxx:1043 xxx.xxx.xxx.xxx:0 LISTENING
TCP    xxx.xxx.xxx.xxx:139 yyy.yyy.yyy.yyy:1182 ESTABLISHED
TCP    xxx.xxx.xxx.xxx:1060 xxx.xxx.xxx.xxx:0 LISTENING
```

The ports **135**, **445**, **1043**, **139** and **1060** are already in use and thus can not be used as tunnel server ports.

6.2.2 UNIX/Linux/MacOS X

Open a shell like **xterm**, etc.

```
[localhost] ~ $ netstat -lnt
```

```
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address Foreign Address State
tcp 0 0 localhost:33921 target1:3389 ESTABLISHED
tcp 0 0 localhost:33793 target2:5190 ESTABLISHED
```

The ports **33921** and **33793** are already in use and thus can not be used in this example.

7 Public/Private key authentication

7.1 Creation on Windows

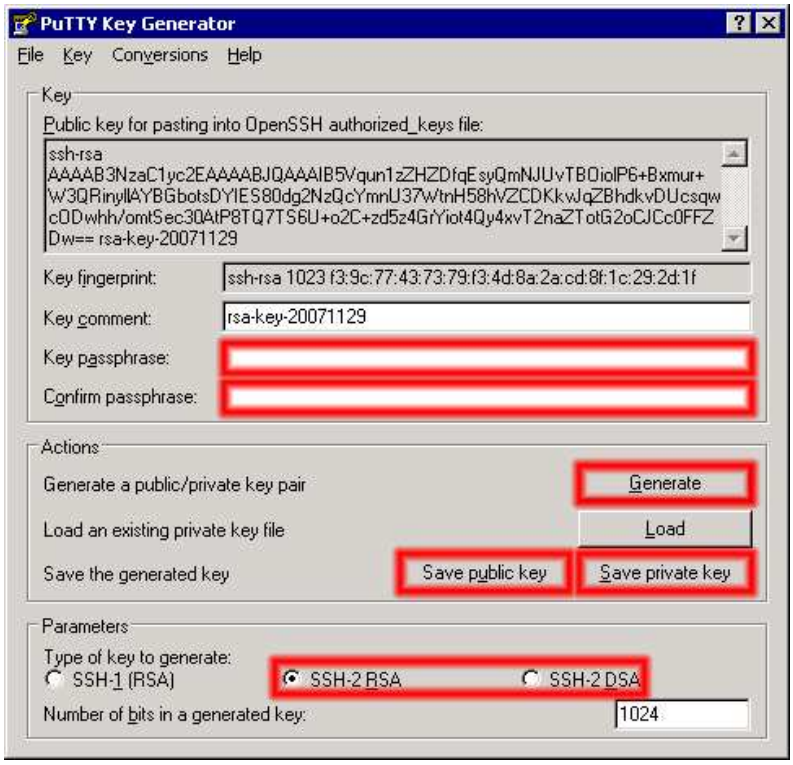


Figure 7: **PuTTY Key Generator** (Windows)

Parameter	Value	Description
Key passphrase	any	The phrase protecting your private key
Type of key to generate	SSH-2-RSA or SSH-2-DSA	

You can use the **PuTTY Key Generator** to create keypairs. It comes with the NetInstall version of PuTTY or can be downloaded[7].
Start the key generator, choose a key type under **Parameters** and click on **Actions** → **Generate**
Enter a passphrase to protect your keys in the fields 'Key passphrase' and 'Confirm passphrase'. Now save both public and private keys. **Your public keys should have the same name as your private keys with the addition of the suffix** `.pub`.

[7] ftp://ftp.chiark.greenend.org.uk/users/sgtatham/putty-latest/x86/puttygen.exe

7.2 Creation on UNIX/Linux/MacOSX

Create a set of keys on the remote machine by doing the following:

```
ssh-keygen -t rsa
ssh-keygen -t dsa
```

It is highly advisable to **issue a non-trivial passphrase** for the keys to prevent login abuse. Now copy your public keys to the target machine as such:

```
scp ~/.ssh/*.pub UserID@target_machine:~/.ssh
```

7.3 Afterwards...

After having performed the above procedures, please log into **bastion.desy.de**, type `faq` and follow the instructions under 'How to use public/private keypairs?'.

8 SSH-Agent

An SSH agent manages key exchange and authentication for any amount of keys. As a result you have to type your key's passphrase only once and the agent stores the decrypted private key in memory for later use. If you initiate a connection to any machine that have correspondent public keys, login will be performed without further input from you.

8.1 Windows

Pageant from the PuTTY package is used as an SSH agent under Windows. It comes with the NetInstall version of PuTTY or can be downloaded[8]. Once started, it can be opened by clicking its icon in Windows' systray.

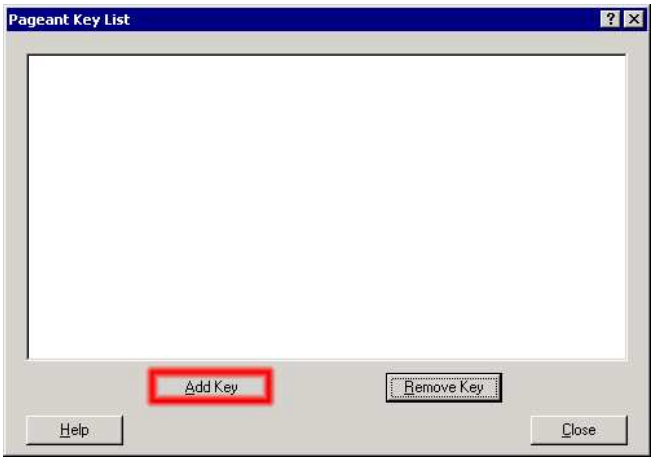


Figure 8: **PuTTY Pageant** (Windows)

Click on **Add Key** → choose your **private key(s)** (suffix: .ppk) → **Open**
Pageant will now authenticate automatically when using **PuTTY** to log into a system which is equipped with your public keys.

8.2 UNIX/Linux/MacOSX

Start the SSH-Agent by running `ssh-agent` in a shell.
Load your private key(s) into the agent:
`ssh-add ~/.ssh/id_dsa` for the DSA keypairs
`ssh-add ~/.ssh/id_rsa` for the RSA keypairs

Now connect to a machine which is equipped with your public keys.

[8] ftp://ftp.chiark.greenend.org.uk/users/sgtatham/putty-latest/x86/pageant.exe