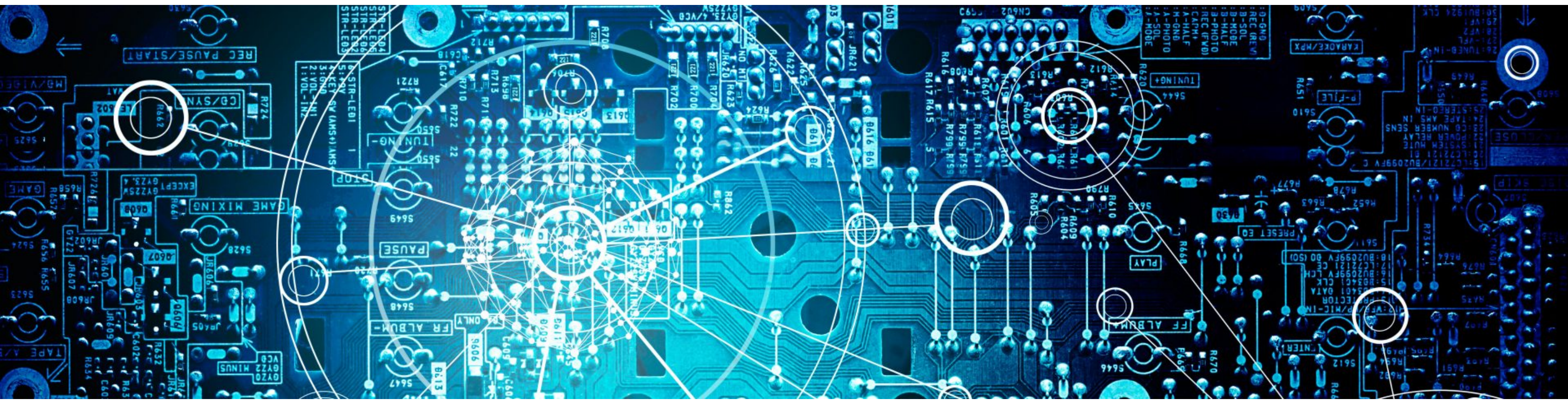


OPENSSH JUMP-HOST AND FILE-TRANSFER

July 31, 2015 Romain Aviolat Crypto, Network security, System administration, Training 2 comments

This article was inspired by a previous post on my personal blog: https://www.freeture.ch/?p=815

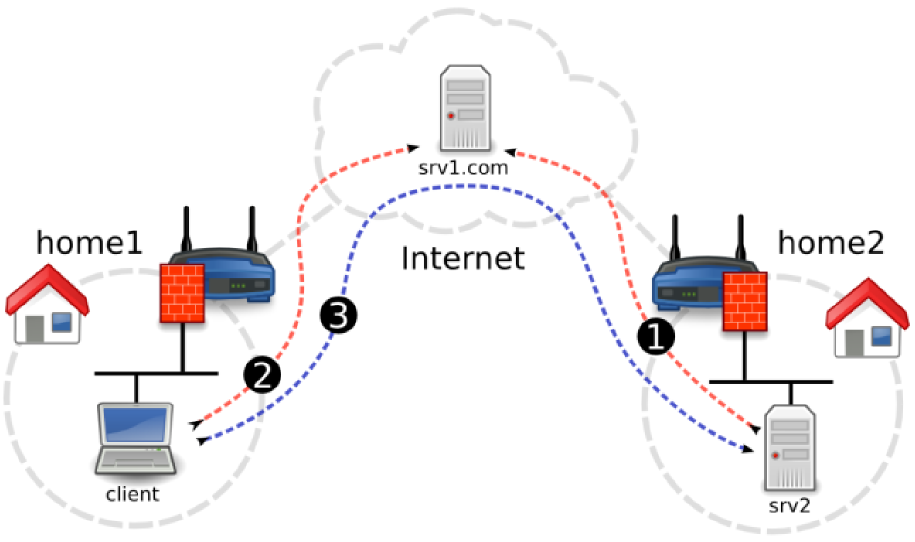
Intro

OpenSSH is a great tool, everybody knows that ([even Microsoft]()). It's commonly used to securely take control or copy a bunch of files to or from remote machines. Another common scenario is to have a machine between two networks that acts as a gateway or "jump-host" between those networks; you connect to this machine and from there you open another connection to the other network. Something annoying is when you want to transfer files between the two networks, you'll have to copy the files two times, once from the source to the gateway and then from the gateway to the destination. So if your files are huge, it means having disk space available on the jump-host and if you do so frequently it's a headache; and everybody knows that sysadmins are lazy guys.

This tutorial will explain how to copy files from the source to the target directly and vice-versa.

Big-picture

In my example, target server (srv2) is behind a firewalled + NATed connection at home2 and we have no access to the router, so we can't configure port-forwarding. Outbound connection is not filtered though, so we will initiate a reverse-tunnel to join the jump-host (srv1.com) so connection can then be initiated from srv1.com to srv2 through that persistent tunnel. Then we will configure the client machine located at home1 to access srv2 through srv1.com reverse-tunnel. We will finish with a bunch of example on how to transfer files between the client and srv2. The whole setup will use public key authentication instead of static passwords.



config

Step 1: Let's start srv2 and srv1.com reverse-tunnel configuration:

1.1 Create a private/public ssh key-pair on srv2:

```
$ ssh-keygen -t rsa -b 4096
```

1.2: Copy srv2 public-key in srv1.com *\/home/myuser/.ssh/authorized_keys* file

1.3: Try to connect from srv2 to srv1.com, you should obtain a shell without entering a password

```
$ ssh myuser@srv1.com
```

1.4: Open again */home/myuser/.ssh/authorized_keys* on srv1.com and add the following options before srv2 public key:

```
command="/bin/false",no-agent-forwarding,no-pty,no-user-rc,no-
X11-forwarding
```

The whole file will looks something like this

```
command="/bin/false",no-agent-forwarding,no-pty,no-user-rc,no-
X11-forwarding ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAACAQC5TBa86GUdvTdTuK5nLE
aIFVp2zTwxWD+NLG3EfrCRoCA/iaRVM2lF/FyeOdQ2WfMcg4AzpxV
y6GTpRWAYzO2uZKSmk+wMxLqU5k5nrOOrBRuwIWXmbTVhDCJX
+A9RMG+BL7nOrwNeg2niuow5tiGUi+HMTh9NIPDiP9e36jOWQL2l
TDtJ1wXFfR+zPoiCR9bCEphfioseVJSFEzj1pDLc8IQvoLrCcbSBoy16s
KPxRfuP2dSmB3jU6tNMS6r79RC4CYJ5iYjBNU8TBtjsAvrskDqSD9vR
lAR2lD6o0jSqKowm1AaX7bkUvM7RbJCniDsUFj6Erz2SxsXsVC3FOsP
6sZyLuiggJBiVoQ7Fp4YHJyNsBSzoEIsTNxAwGaQIB5fYQ6ZlEmW+tP
nC1vrzZDUj5s90nkldFFP3g4V1NkcXTLWTrjBkU8e8s6IBTpJcCELaLT
ZzQ9hXEjlR6zuJslPwXaXyMoEANGHWNAoJvj1ldk9h4+sUws4DluuU
O1LKbDmjQ9+hC+ylR7nYYCkzCkSsQoHJS3ZFeZWkDC3ZTLrTtG5oP
i+zYGb7j+BEFfaSL1CAz7n0Ai87ruN7Rf6CpMtjJsO2aCFxwSZ0sRFfX
Ud9RJdXzDBGOC6IIcbUDcwOWAL2vrYiiehloG7HMQ+2Xup5ddIXV5
yBtQ== myuser@srv2
```

This will harden a bit the connection from srv to srv1.com (no shell, no X11 forwarding, …), more info about it here or here

1.5: We will create a script that keeps the reverse-tunnel opened on srv2, copy the following script on srv2 homedir (call it callhome.sh) and make it executable:

```
#!/bin/bash

process=$(pidof ssh)

if [[ $process == “” ]] ; then
ssh -TNnR 19999:localhost:22 myuser@srv1.com;
fi
```

1.6: Insert the following crontab entry on srv2

```
*/1 * * * * /home/user/callhome.sh
```

1.7: Connect to srv1.com, the tunnel should have been opened, you can check that with the following command:

```
# netstat -tulpn | grep 19999
tcp 0 0 127.0.0.1:19999 0.0.0.0:* LISTEN 25261/sshd:
tcp6 0 0 ::1:19999 :::* LISTEN 25261/sshd:
```

In this example we can see that the reverse tunnel has created two sockets *128.0.0.1:19999* and *::1:19999*. We should now be able to connect to srv2 through it.

```
$ ssh myuser@127.0.0.1:19999
```

You’ll need to supply the password for myuser, as we haven’t yet configured pubkey authentication in these instructions. We will do that now.

Step 2: Pubkey authentication from srv1.com to srv2:

2.1: Create a private/public ssh key-pair on srv1.com:

```
$ ssh-keygen -t rsa -b 4096
```

2.2: Copy srv1.com public-key in srv2 */home/myuser/.ssh/authorized_keys* file

2.3: You should now be able to connect using pubkey authentication from srv1.com to srv2 through the reverse-tunnel established from srv2 to srv1.com, pfew ! Just try the above command again and this time you should obtain the shell directly.

2.4: Like previously we will harden a bit the authentication mechanism; add the following before the key in */home/myuser/.ssh/authorized_keys* file

```
command="/bin/false",no-agent-forwarding,no-pty,no-user-rc,no-X11-forwarding
```

2.5: Great the hardest part is done, we will now work on the machine located at home1.

Create a private/public ssh key-pair on the client, we're kinda used to it… :)

```
$ ssh-keygen -t rsa -b 4096
```

2.6: Copy the client public key in */home/myuser/.ssh/authorized_keys* on srv1.com

This time we will add the following option line before the public-key

```
command="/bin/nc",no-agent-forwarding,no-pty,no-user-rc,no-X11-forwarding
```

2.7: Create the following file in your user home dir *~/.ssh/config*

```
Host srv2
ProxyCommand ssh myuser@srv1.com nc 127.0.0.1 19999
```

So basically when we connect to host `srv2` from the client machine the connection will be initiated to `srv1.com` with user `myuser` then `nc` will be used to open the connection through the reverse-tunnel. What's very cool with this mechanism is that it's transparent to the application that connects to the remote host.

Few examples

If your setup was made correctly you shouldn't be prompted for a password:

connect to srv2:

```
$ ssh myuser@srv2
```

copy something to srv2

```
$ scp myfile myuser@srv2:
```

scp is very handy to copy a file or a directory but it lacks features. For example if you want to make your backups to or from srv2 rsync will be much more suited (resume failed transfers, match files using complex filters, recursively crawl remote directories, ...), so here's how it can be used:

```
rsync -avz -e "ssh -o StrictHostKeyChecking=no" --progress
myuser@srv2:source_dir dest_dir/
```

notes

Gentoo doc, SSH jump host

OpenSSH man page

OpenSSH Client Configuration Files

Restrict SSH logins to a single command

Rsync homepage

Scp or rsync with a jump host between the source and the destination

Hope you enjoyed it,

+++

Romain