How to Enable SFTP on MPE

an Allegro Consultants Whitepaper

Let's begin this discussion with some acknowledgements and a list of prerequisites.

That we can run SFTP on MPE is due to the outstanding efforts of folks like Mark Klein, Mark Bixby and Ken Hirsch and others. Their skill and contributions have improved MPE beyond measure.

The prerequisites include:

- Running MPE 6.5 or better.
- Your system is patched as well as possible – especially for networking!
- Having DNS configured. This means /etc/resolv.conf (aka RESLVCNF.NET.SYS) is properly configured or /etc/hosts (aka HOSTS.NET.SYS) has been modified.

Most of the "what to type" examples presented below can be simply copy-n-pasted from this document into your 3000 session. Use this hint to your advantage ☺

On Allegro's web server, you can obtain the following files:

- sftpstd.wrq – a store-to-disc file in Reflection "Labels" format which contains
  - openssh 3.7.1p2
  - openssl 0.9.8e
  - gzip 1.2.4
- PERLSTD.gz – another store-to-disc file that has been gzip'ed which contains
  - Perl 5.8.8 along with…
  - …many helpful modules included but especially the interface to the SHA-1 encryption algorithm.

One more thing – this paper shows how to enable **out-bound** sftp only (*from* your 3000 to some other server (called <*somehost*> in the rest of this paper) running sshd).

“Installing” SFTP

The good news is – there is no actual install! Rather, it is just a simple restore. ☺

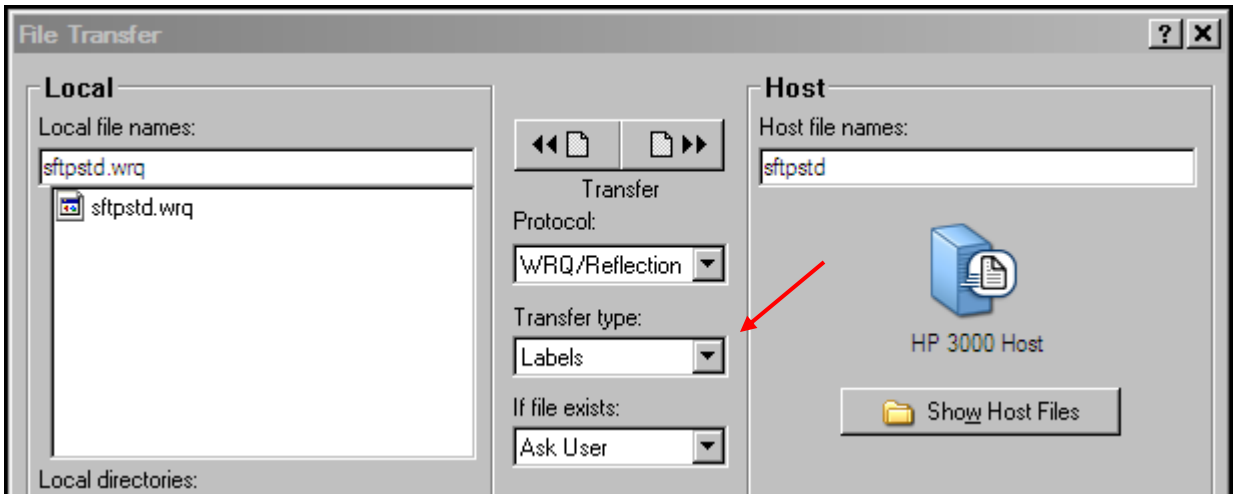
The SFTPSTD file looks like this on an MPE system:

```
:listfile sftpstd,2
ACCOUNT=  SYS          GROUP=   PUB

FILENAME  CODE  ------------LOGICAL RECORD-----------  ----SPACE----
                  SIZE  TYP        EOF      LIMIT R/B  SECTORS #X MX

SFTPSTD   STORE   128W  FB       229363   16776959   1   229376  *  *
```

When this file is on (finally) on your system, it should look similar.

Start by logging on as MANAGER.SYS.

When you upload SFTPSTD to your system, the Reflection File Transfer window should look something like the following:



Use the following commands to restore the files:

```
:file sftpstd;dev=disc
:restore *sftpstd;/;show;create
```

You’ll see...

```
RESTORE  *sftpstd;/;SHOW;CREATE

WED, DEC 14, 2011, 12:23 PM

'CREATE' OPTION DEFAULTING TO 'CREATE=ACCOUNT,GROUP,CREATOR,PATH'
BASED ON YOUR CAPABILITIES  (S/R 502)
RESTORE CREATED ACCOUNT "OPENSSL "
```

```
RESTORE CREATED GROUP   "A0100    " IN ACCOUNT "OPENSSL "

WILL RESTORE      122 HFS DIRECTORIES; HFS DIRECTORIES ON MEDIA      122
WILL RESTORE      148 SYMBOLIC LINKS ; SYMBOLIC LINKS ON MEDIA      148
WILL RESTORE     2342 FILES          ; NUMBER OF FILES ON MEDIA     2342

VOLUME RESTRICTIONS            SECTORS CODE   MEDIA FILENAME
DISC                      :C        16            1 /OPENSSL/A0100/.profile
DISC                      :C        32            1 /OPENSSL/A0100/INSTALL
DISC                      :C        32            1 /OPENSSL/A0100/README
DISC                      :C         0 HFSDIR     1 /OPENSSL/A0100/bin/
DISC                      :C        16            1 /OPENSSL/A0100/bin/c_rehash
DISC                      :C      7872 NMPRG      1 /OPENSSL/A0100/bin/openssl
DISC                      :C         0 HFSDIR     1 /OPENSSL/A0100/certs/
<<snip>>
```

The restore will create one new account – OPENSSL – and one new user – MGR.OPENSSL. Secure these with passwords as necessary.

Create the following links:

```
:newlink /usr/local/bin/gunzip,/usr/local/bin/gzip
:newlink /usr/local/bin/sftp,/opt/openssh-3.7.1p2/sftp
:newlink /usr/local/bin/ssh,/opt/openssh-3.7.1p2/ssh
:newlink /usr/local/bin/ssh-keygen,/opt/openssh-3.7.1p2/ssh-keygen
:newlink /usr/local/libexec/ssh-rand-helper,/opt/openssh-3.7.1p2/ssh-rand-helper
:newlink egdctl,/opt/openssh-3.7.1p2/EGDCTL
```

Regarding the last two newlink commands…

1. You may not have a `/usr/local/libexec` directory. If newlink fails because the directory is missing, do the following:

   ```
   shell/iX> cd /usr/local
   shell/iX> mkdir libexec
   shell/iX> chmod 755 libexec
   ```

   Do an "`ll`" to confirm and then redo the newlink command.

   ```
   drwxr-xr-x    3 MANAGER.SYS       SYS          416 Dec 13 08:39 libexec
   ```

2. Presuming you are logged on as MANAGER.SYS**,PUB**, then "egdctl" will be created in the PUB group. You may want to put this in a more secure location.

”Installing” Perl

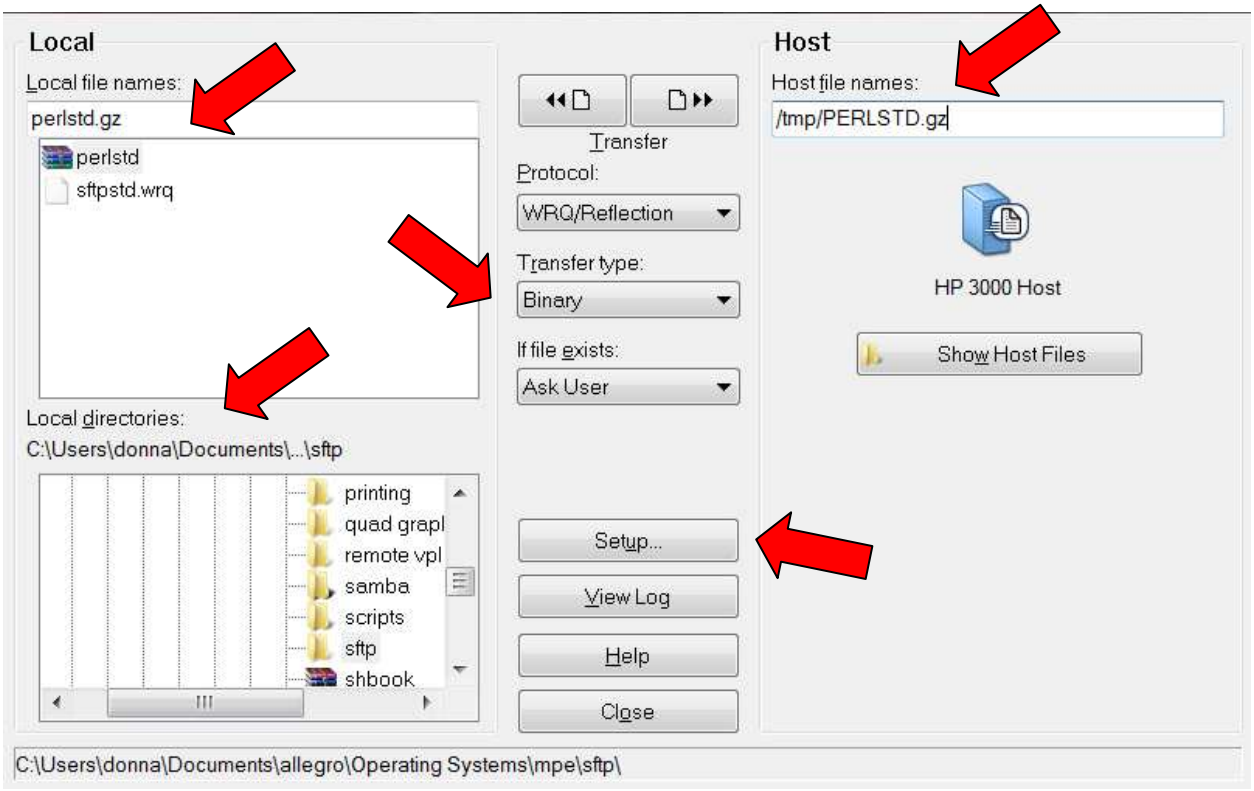
The good news is – this is just a restore as well. The not-so-good news is – the Perl file is really big. So getting it onto your 3000 will be a bit more challenging.

Once the file is downloaded from Allegro to your PC, we recommend using FTP to transfer it to your MPE system. In order for FTP *to* your 3000 to work, JINETD must be running. Open a ‘cmd’ window on your PC and ‘cd’ as necessary to the folder where PERLSTD.gz resides and start ftp:

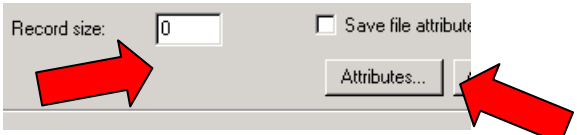
```
C:\Users\myself\Documents>cd ..\Downloads

C:\Users\myself\Downloads>dir PER*
 Volume in drive C has no label.
 Volume Serial Number is B867-3BED

 Directory of C:\Users\myself\Downloads

07/17/2013  12:10 PM        39,940,648 PERLSTD.gz
               1 File(s)     39,940,648 bytes
               0 Dir(s)  158,407,720,960 bytes free

C:\Users\myself\Downloads>ftp my3000
Connected to my3000.allegro.com.
220 HP ARPA FTP Server [A0012I16] (C) Hewlett-Packard Co. 2000 [PASV SUPPORT]
User (my3000.allegro.com:(none)): manager.sys
331 Password required for MANAGER.SYS.  Syntax: userpass
Password:
230 User logged on
ftp> bin
ftp> put PERLSTD.gz /tmp/PERLSTD.gz;rec=-1,,b,ascii;disc=2147483647
ftp> quit
```

The command format for ‘ftp’ is `ftp [host name or IP address]`. If you have both an account and user password set for manager.sys, enter it as `[account password],[user password]`.

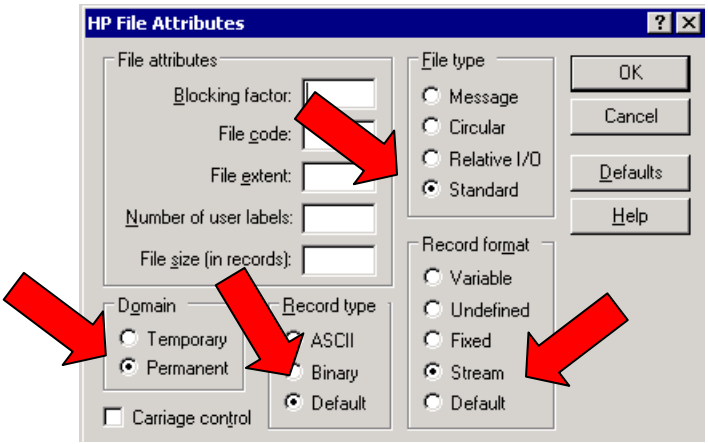
If you can only use Reflection to transfer the Perl file, here are the steps:



1. Navigate to the "Local Directory" where you saved perlstd.gz.
2. Fill-in the "Local file name" field with perlstd.gz
3. Change the Transfer type to Binary
4. Fill-in the "Host file name" field with /tmp/PERLSTD.gz
5. Click on the Setup button to make more changes…



1. Make sure the "Record size" is zero (0).
2. Click on the Attributes button to make more changes…



1. Set the File type to Standard
2. Set the Domain to Permanent
3. The Record type should be Default
4. The Record format should be stream

With all the Reflection "tweaks" made, click the OK button to back up to the main transfer screen, then click on the right-pointing File transfer button and go find something to do…

Now with the file on the 3000, the first step is to unzip it. Go into the shell and…

```
shell/iX> cd /tmp
shell/iX> ll
-rw-------   1 MANAGER.SYS       0        39940648 Jul 18 10:24 PERLSTD.gz
shell/iX> gunzip PERLSTD.gz
shell/iX> exit
```

Next, rename it into MPE namespace and check it (your EOF value may be different):

```
:rename /tmp/PERLSTD,perlstd
:listfile perlstd,2
ACCOUNT=  SYS         GROUP=  PUB

FILENAME  CODE  ------------LOGICAL RECORD-----------  ----SPACE----
                  SIZE  TYP        EOF      LIMIT R/B  SECTORS #X MX

PERLSTD             1B  BA   238818304 2147483647   1   932896  *  *
```

Finally, restore the files:

```
:file perlstd;dev=disc
:restore *perlstd;/;show;create
```

You'll see…

```
RESTORE  *perlstd;/;SHOW;CREATE

WED, DEC 14, 2011,  1:49 PM

'CREATE' OPTION DEFAULTING TO 'CREATE=ACCOUNT,GROUP,CREATOR,PATH'
BASED ON YOUR CAPABILITIES  (S/R 502)
RESTORE CREATED ACCOUNT "PERL    "
```

```
WILL RESTORE     1255 HFS DIRECTORIES; HFS DIRECTORIES ON MEDIA     1255
WILL RESTORE        5 SYMBOLIC LINKS ; SYMBOLIC LINKS ON MEDIA        5
WILL RESTORE     7529 FILES          ; NUMBER OF FILES ON MEDIA     7529

VOLUME RESTRICTIONS            SECTORS CODE   MEDIA FILENAME
DISC                         :C       0 HFSDIR     1 /PERL/PUB/.cpan/
DISC                         :C       0 HFSDIR     1 /PERL/PUB/.cpan/Bundle/
<<snip>>
```

Because the Perl account was created with default capabilities, you need to add “PH” capability to the PERL account and PUB group:

```
:altacct perl;cap=+PH
:altgroup pub.perl;cap=+PH
```

Additionally, you may wish to secure the Perl account with passwords.

Test Perl to make sure it runs:

```
:perl.pub.perl "-v"

This is perl, v5.8.8 built for PA-RISC1.1
```

Set up a link for Perl:

```
:newlink /usr/local/bin/perl,/PERL/PUB/PERL
```

Step to make SFTP work

Finally, we're to the point of actually trying to use SFTP!

First, the EGDJOB needs to be started. Do this by typing:

```
:egdctl start
```

This job needs to remain running in order to make SFTP to work properly. This probably means that the job should be started when the system comes up and halted when the system is being brought down.

Cleverly enough – `:egdctl stop` – will stop the job ☺

Next, add "PH" capability to the target user and account if they don't already have it:

```
:altacct donna;cap=+ph
:altuser mgr.donna;cap=+ph
```

(This only needs to be done once, of course.)

Go into the shell and run "ssh-keygen" without any parameters just to make sure it works:

```
shell/iX> ssh-keygen
You must specify a key type (-t).
Usage: ssh-keygen [options]
Options:
  -b bits     Number of bits in the key to create.
  -c          Change comment in private and public key files.
  -e          Convert OpenSSH to IETF SECSH key file.
  -f filename Filename of the key file.
  -g          Use generic DNS resource record format.
  -i          Convert IETF SECSH to OpenSSH key file.
  -l          Show fingerprint of key file.
  -p          Change passphrase of private key file.
  -q          Quiet.
  -y          Read private key file and print public key.
  -t type     Specify type of key to create.
  -B          Show bubblebabble digest of key file.
  -C comment  Provide new comment.
  -N phrase   Provide new passphrase.
  -P phrase   Provide old passphrase.
  -G file     Generate candidates for DH-GEX moduli
  -T file     Screen candidates for DH-GEX moduli
```

The first step is to generate a key file. In this example, the passphrase (-N "") is blank. You may have different local requirements regarding the passphrase. *Note: the passphrase is **not** a password.*

```
shell/iX> ssh-keygen -t rsa -N ""
Generating public/private rsa key pair.
Enter file in which to save the key (/DONNA/PUB/.ssh/id_rsa): <return>
Created directory '/DONNA/PUB/.ssh'.
Your identification has been saved in /DONNA/PUB/.ssh/id_rsa.
Your public key has been saved in /DONNA/PUB/.ssh/id_rsa.pub.
The key fingerprint is:
23:aa:e1:78:7a:bc:5c:64:9a:ae:74:b8:91:71:ad:48 MGR.DONNA@mpesys
```

Let's see what we did!

```
shell/iX> ll -a
total 2
-rw-rw----   1 MGR.DONNA         DONNA        137 Dec 14 14:14 .sh_history
drwx------   2 MGR.DONNA         DONNA        416 Dec 14 14:13 .ssh

shell/iX> ll .ssh/
total 3
-rw-------   1 MGR.DONNA         DONNA        883 Dec 14 14:13 id_rsa
-rw-r-----   1 MGR.DONNA         DONNA        228 Dec 14 14:13 id_rsa.pub
```

If the permission for .ssh/ is not "drwx------", correct it by doing:

```
shell/iX> chmod 700 .ssh/
```

At this point you can test SFTP by doing:

```
shell/iX> sftp user@donnalinux
Connecting to donnalinux...
The authenticity of host 'donnalinux (192.168.1.100)' can't be established. RSA key
fingerprint is b1:60:dd:0e:2d:ab:4f:be:67:ff:cf:7b:b6:19:d8:7d.
Are you sure you want to continue connecting (yes/no)?
y
e
s

Warning: Permanently added 'donnalinux,192.168.1.100' (RSA) to the list of known
hosts.
user@donnalinux's password:
```

Things to note:

- You run SFTP by specifying "<someuser>@<somehost>" on the command line – that's a change from regular FTP.
- The "authenticity" message is normal the *first time* you connect.
- You have to type "yes" (and <return>) to the "are you sure" question. And, yes – each letter will appear on a new line!
- The "warning" is also normal.
- When you provide the password, each character will also generate a line feed.

You can actually stop at this point. (Yeah!) However, one of the desirable features of SFTP is the ability to do password-less transfers. This is accomplished by copying one of the key files to <somehost>. To do that, use the following steps.

On <somehost> as <someuser>, confirm that .ssh/ exists and security for the directory is set to 700. If necessary make the directory and chmod it.

Presuming, you've completed your SFTP logon to <somehost> put id_rsa.pub onto <somehost>:

```
Remote working directory is /home/user
sftp> cd .ssh
Remote directory is now /home/user/.ssh
sftp> put .ssh/id_rsa.pub id_rsa.pub
local:id_rsa.pub => remote:/home/user/.ssh/id_rsa.pub
sftp> exit
```

On <somehost>, look to see what's in .ssh/. If you see something like the following:

```
[user@donnalinux ~]$ ll .ssh/
total 4
-rw-rw-r-- 1 user user 228 May 24 10:15 authorized_keys
-rw-rw-r-- 1 user user 228 Dec 14 13:46 id_rsa.pub
```

→If there is already an authorized_keys file present, id_rsa.pub needs to be appended to it:

```
[user@donnalinux ~]$ cd .ssh/
[user@donnalinux ~]$ cat id_rsa.pub >> authorized_keys
```

→If there is **no** authorized_keys file, simple rename id_rsa.pub to authorized_keys:

```
[user@donnalinux ~]$ cd .ssh/
[user@donnalinux ~]$ mv id_rsa.pub authorized_keys
```

Correct access:

```
[user@donnalinux .ssh]$ chmod 640 authorized_keys
```

Back on the MPE system, do:

```
shell/iX> sftp user@donnalinux
Connecting to donnalinux...
sftp>
```

Verily tis cool!