Installing Firmware Updates on the FlexDDS-NG Rack

You need to download the firmware archive called `flexdds_ng_firmware.zip` from wieserlabs.com to your local computer. **For now, do not rename this file and do not unpack it.**

There are 2 different ways of installing a firmware update on the FlexDDS-NG Rack: Over the network and by use of a micro-SD card. The network methods differs whether you have a Windows or a Linux *host* computer. (The built-in computer inside the FlexDDS-NG Rack always runs Linux.)

NOTE: Please remove all USB cables from the slots of the FlexDDS-NG Rack before starting the firmware update.

Table of contents:

A. Firmware Update Procedure via Micro-SD Card

1. Power down the FlexDDS-NG Rack

If the FlexDDS-NG Rack is powered on, push the green power button on te left bottom to switch it off.

The green pushbutton must be **constant off or slowly fading on and off**. If it is blinking or constantly on, the FlexDDS-NG Rack is not off.

If you cannot switch off the Rack, press the power button for 5 seconds or switch it off via the power switch on the back side.

2. Remove the micro-SD card in the FlexDDS-NG Rack control slot

The micro-SD card is accessible from the main slot and labeled ”Micro SD”. Gently press in the card (e.g. with a coin) until you hear a quiet “click” sound. The card then comes back out and you can remove the card.

3. Unpack the firmware ZIP file onto the micro-SD card

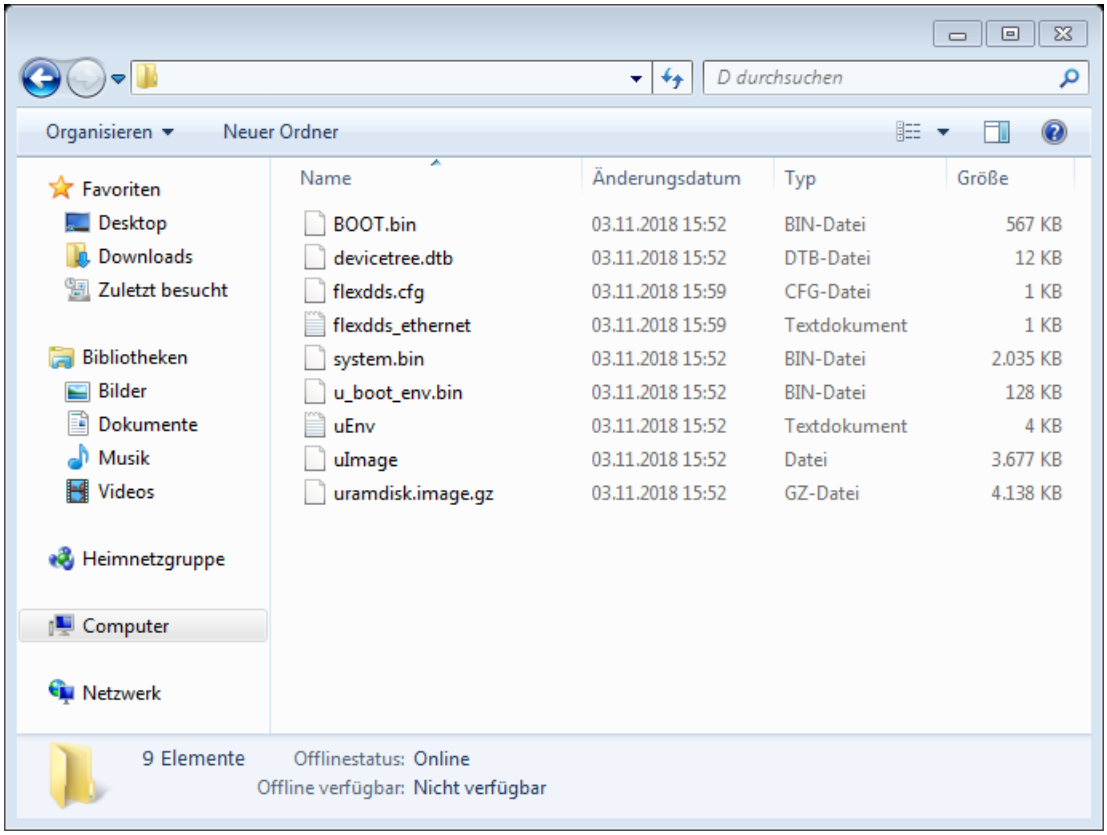
Put the card in a card reader attached to your computer. It has a FAT (VFAT) file system on it which can be read by any current Windows, Linux and Mac OS.

Unpack the contents of the `flexdds_ng_firmware.zip` and copy them directly onto the micro-SD card.

The contents of the card should look like in the screen shot on the next page. The files “flexdds.cfg” and “flexdds_ethernet.txt” may or may not be present depending on your configuration of the Rack.

NOTE: Delete any file called “FW_UPDATE_COMPLETE” on the SD card.

As long as this file exists, no update will be performed.



Finally, safely remove (or eject or un-mount) the micro-SD card.

4. Install the micro-SD card back in the FlexDDS-NG Rack control slot

This works like the removal in step 2: Press gently until you hear a “click” sound. The card is now again locked and cannot be removed simply by pulling it.

NOTE: The electrical contacts on the SD card face towards the frontpanel text “Micro SD”.

5. Power up the FlexDDS-NG Rack and wait for the update to complete

The FlexDDS-NG Rack reboots itself and installs the firmware update while rebooting.

The green power LED will keep flashing until the firmware update is complete.

You can follow the firmware update steps on the USB console if you like (see part C).

B. Network Firmware Update Procedure

New firmware updates can be installed on the FlexDDS-NG Rack over the network by copying it onto the rack's built-in Linux computer and launching the pre-installed fimware update application on it.

The network update instructions (chapters B1 or B2) assume that the FlexDDS-NG Rack is connected to the network and can be reached via its IP address from the local computer. For that, you need to plug in a network cable into the receptable labeled "**Ethernet**".

NOTE: Do not plug any network cables into the receptable labeled "LVDS".

After plugging in the network cable, the yellow LED should be on to indicate network link detection.

The FlexDDS-NG Rack will automatically configure an IP address via DHCP unless configured differently via a configuration file the micro-SD card. (refer to the FlexDDS-NG manual on how to set the IP address).

In order to see the IP address, you can use the USB console as described in part C. This also allows you to obtain the MAC address so that you can configure the DHCP server to assign a static IP address to the FlexDDS-NG Rack.

If your host computer runs **Linux**, follow the steps in part B1.
if you run **Windows** on your host computer, follow the steps in part B2.

B1. Network Firmware Update Procedure for Linux Host Computers

1. Copy the firmware update archive called `flexdds_ng_firmware.zip` onto the FlexDDS-NG Rack over the Network

Be sure that the file name is `flexdds_ng_firmware.zip` and that you have *not* renamed the file.

Copying can be done via **`scp`** from the OpenSSH package which is usually pre-installed. If not, install it first. Open a terminal and execute:

```
bash> scp /path/to/flexdds_ng_firmware.zip flexdds@1.2.3.4:
```

Only the blue part has to be typed. Replace "1.2.3.4" with the real IP address of your FlexDDS and don't forget the ":" at the end.

Of course, replace "/path/to/" with the real path to the ZIP file, maybe "~/Downloads/".

When asked for a password, type in "**mosei0Ke**" (with a zero before the K).
A complete shell transcript may look like this:

```
bash> scp Downloads/flexdds_ng_firmware.zip flexdds@192.168.11.109:
The authenticity of host '192.168.11.109 (192.168.11.109)' can't be established.
RSA key fingerprint is SHA256:7RI1pwvCrxQteuMgtupOJ4XgwdZshrFwDEnGE3FU+FY.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.11.109' (RSA) to the list of known hosts.
flexdds@192.168.11.109's password: mosei0Ke
flexdds_ng_firmware.zip                          100% 6496KB   5.2MB/s   00:01
bash> _
```

When not connecting for the first time, the grey text will be missing as your computer already knows the host key of the FlexDDS-NG Rack.

2. Launch the firmware update utility on the FlexDDS-NG Rack

This is done by opening a terminal session with the FlexDDS-NG Rack over the network via SSH.

On a Linux host, continue in the terminal by logging into the FlexDDS-NG Rack:

```
bash> ssh flexdds@1.2.3.4
flexdds@1.2.3.4's password: mosei0Ke
flexdds@flexdds:~ > _
```

Again, only the blue part has to be typed and again replace 1.2.3.4 with the real IP address of your FlexDDS. When asked for the password, again type in "**mosei0Ke**" (with a zero before the K).

Continue in the SSH terminal session by starting "**flexdds_fw_update**":

```
flexdds@flexdds:~ > flexdds_fw_update
```

After pressing return, the green power LED will start blinking and the firmware update begins. Watch the output on the terminal. **Do not close the terminal.**

A complete transcript is expected to look similar to this:

```
bash> ssh flexdds@192.168.11.109
flexdds@192.168.11.109's moseiOKe
flexdds@flexdds:~ > flexdds_fw_update
--------------------------------------------------------------------------------
FlexDDS-NG Firmware Update Utility

Running as: root
Firmware archive: /home/flexdds/flexdds_ng_firmware.zip
Mounted SD card at: /media/sdcard

Archive:  /home/flexdds/flexdds_ng_firmware.zip
  Length      Date    Time    Name
---------  ---------- -----   ----
   580132  04-27-2017 12:15   BOOT.bin
    11521  04-24-2017 02:21   devicetree.dtb
  2083740  04-27-2017 12:15   system.bin
  3765184  04-23-2017 12:57   uImage
   131072  04-24-2017 02:27   u_boot_env.bin
  2364733  05-08-2017 23:09   uramdisk.image.gz
     3185  04-24-2017 02:56   uEnv.txt
 --------                     -------
  8939567                     7 files

Unpacking /home/flexdds/flexdds_ng_firmware.zip ... (PLEASE WAIT)
Archive:  /home/flexdds/flexdds_ng_firmware.zip
  inflating: BOOT.bin
  inflating: devicetree.dtb
  inflating: system.bin
  inflating: uImage
  inflating: u_boot_env.bin
  inflating: uramdisk.image.gz
  inflating: uEnv.txt
Flushing:  OK


   ************************************************************
   ** Rebooting to install firmware update.                  **
   **                                                        **
   **             DO NOT POWER OFF THE DEVICE                **
   **                                                        **
   ** This takes several minutes. Please be patient...       **
   ** You can follow the process over the serial console.    **
   ************************************************************

--------------------------------------------------------------------------------
flexdds@flexdds:~ > _
```

3. Wait for the firmware update to complete

You can now close the terminal. **Do not power off the FlexDDS-NG.**

The FlexDDS-NG Rack reboots itself and installs the firmware update while rebooting.

The green power LED will keep flashing until the firmware update is complete.

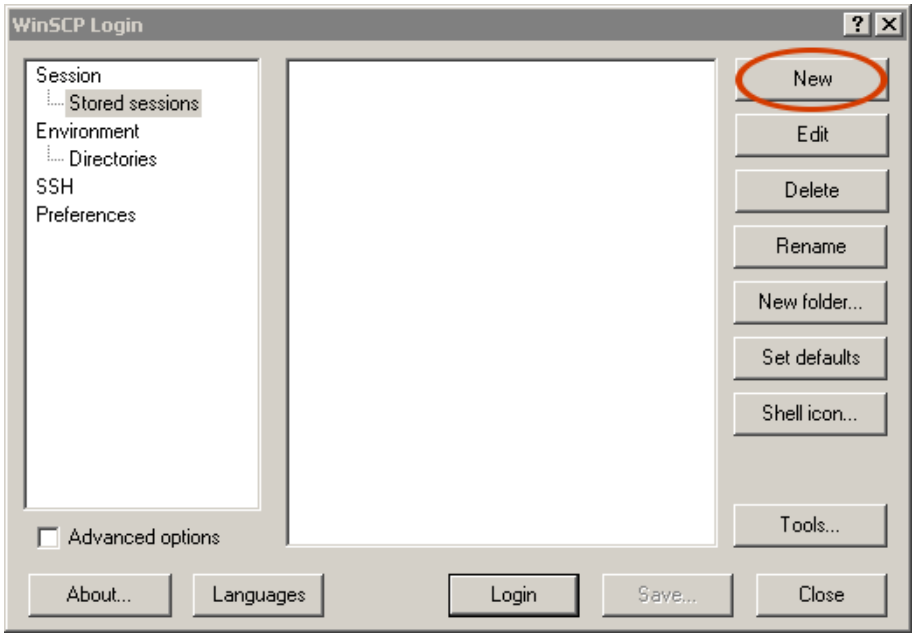
You can follow the firmware update steps on the USB console if you like (see part C).

B2. Network Firmware Update Procedure for Windows Host Computers

1. Copy the firmware update archive called `flexdds_ng_firmware.zip` onto the FlexDDS-NG Rack over the network

You need **WinSCP** to transfer the update to the FlexDDS-NG Rack. You can download it from `http://winscp.net`.

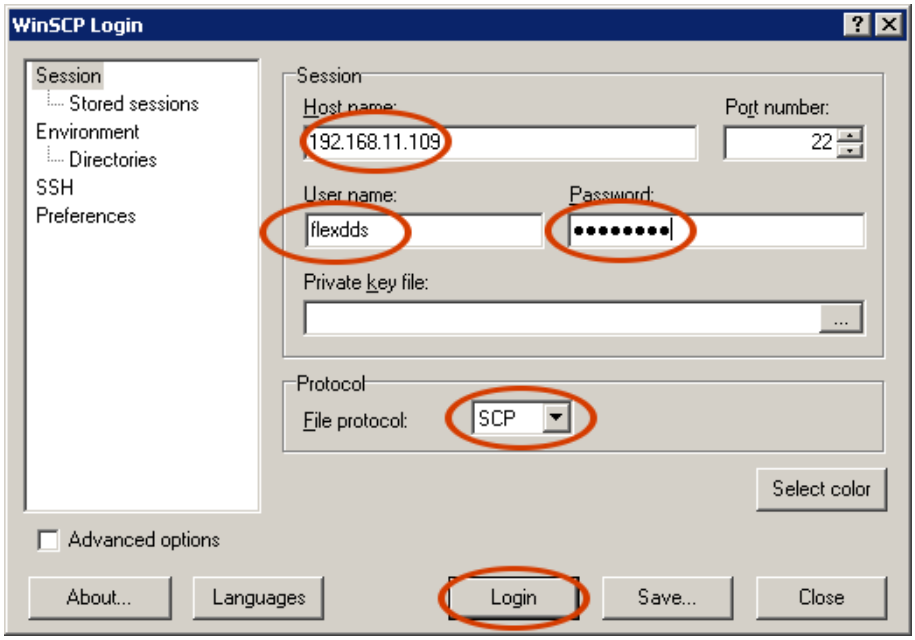
Launch WinSCP and press "**New**".

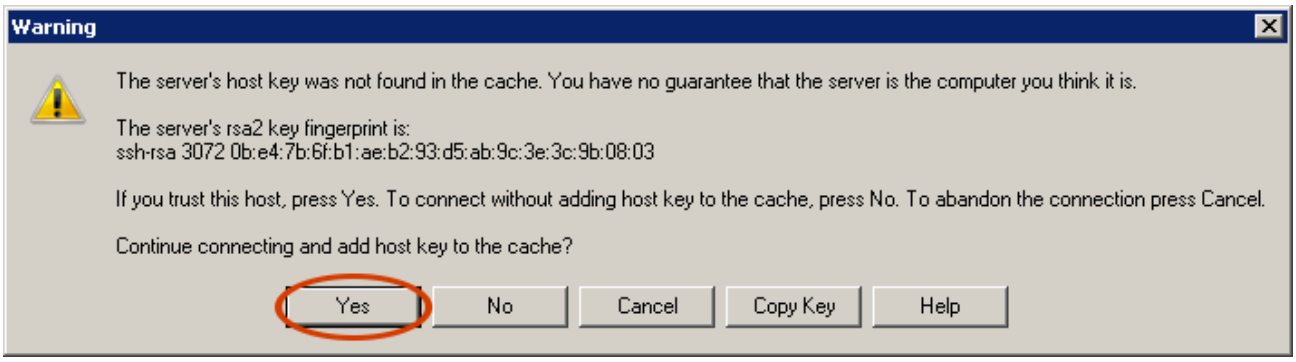


In the next dialog, enter the **IP address** of the FlexDDS-NG Rack below "Host name" (use the actual one, do not use 192.168.11.109). Next, enter the user name "**flexdds**" and the password "**mosei0Ke**" (with a *zero* in front of the "K"). Also, change the protocol selection from "SFTP" to "**SCP**" in the center of the dialog.

Finally, connect to the FlexDDS by clicking "**Login**" on the bottom of the dialog.

(You can first click "Save..." to save the setupfor future firmware updates.)

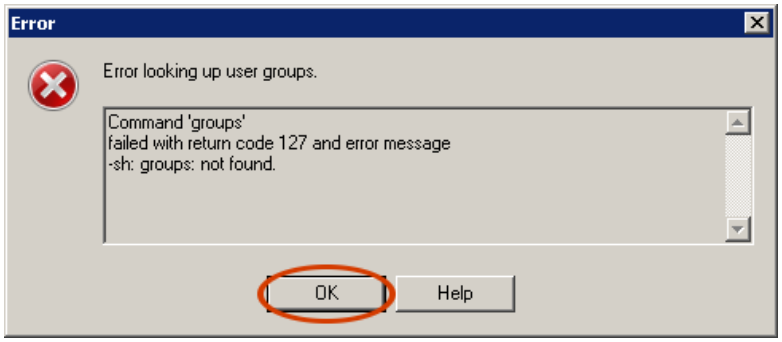


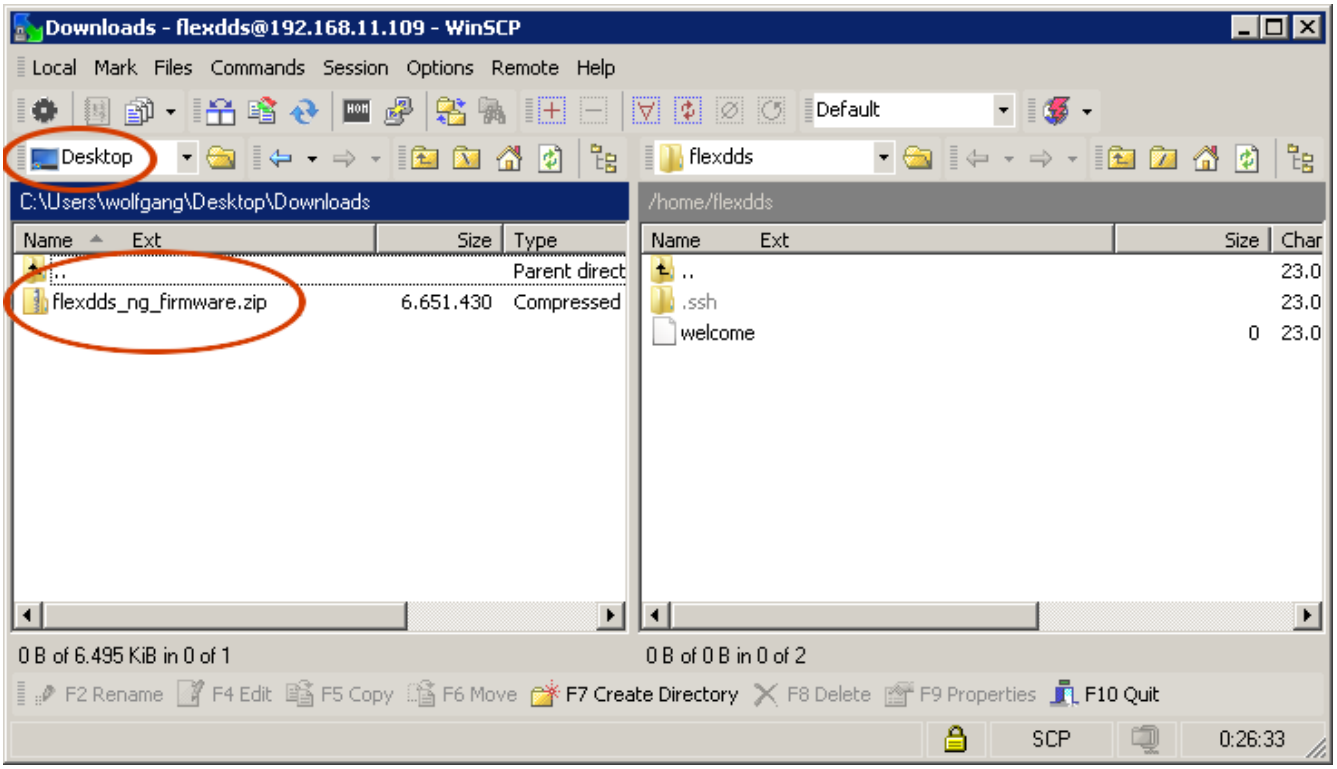


When connecting for the first time, a security warning as the one shown above will appear. Click "**Yes**" to continue.

Next, a "groups" error may appear (see right).

Ignore the error by clicking "**OK**".

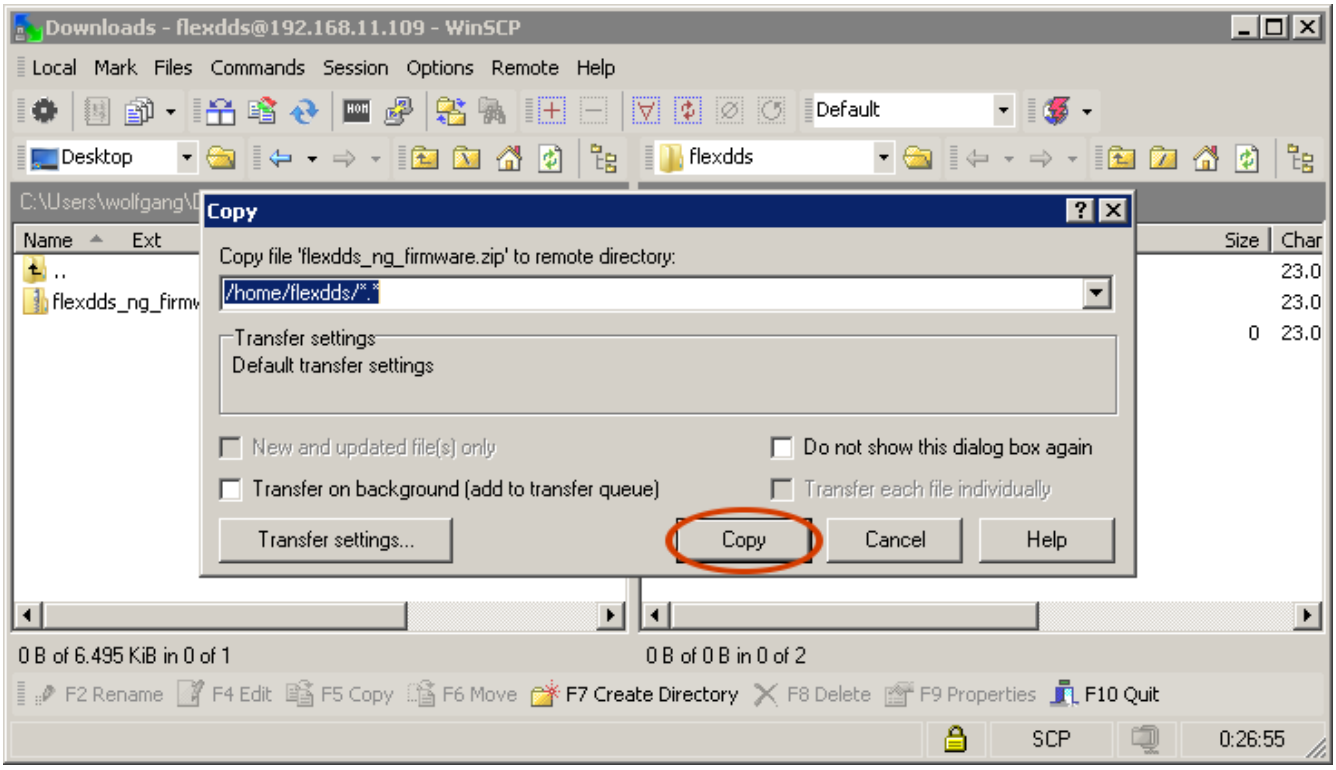




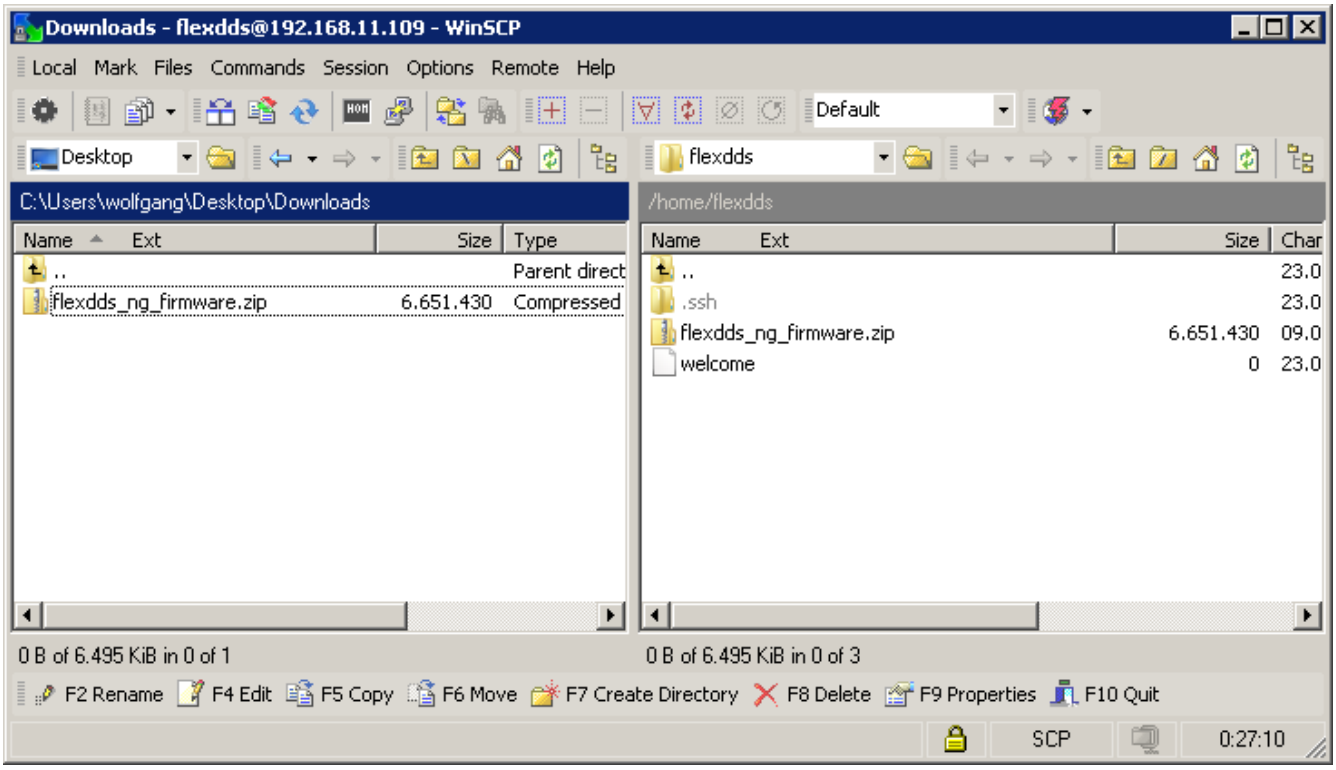
You are now connected to the FlexDDS-NG Rack (see image above). The WinSCP window shows the local files and directories on your computer on the *left side*. The *right half* shows the remote directory on the FlexDDS-NG Rack.

Locate the **flexdds_ng_firmware.zip** on your computer by navigating the directories on the left.

Then, drag the **flexdds_ng_firmware.zip** into the big white space of the right window.



A copy dialog will appear (see above). Do not alter anything in the dialog, just click "**Copy**".



Once copying is finished, you will see the **flexdds_ng_firmware.zip** in the directory listing on the right half of the window. The firmware ZIP file has now been successfully copied onto the FlexDDS-NG Rack.

You can now **close** the WinSCP window.

2. Launch the firmware update utility on the FlexDDS-NG Rack

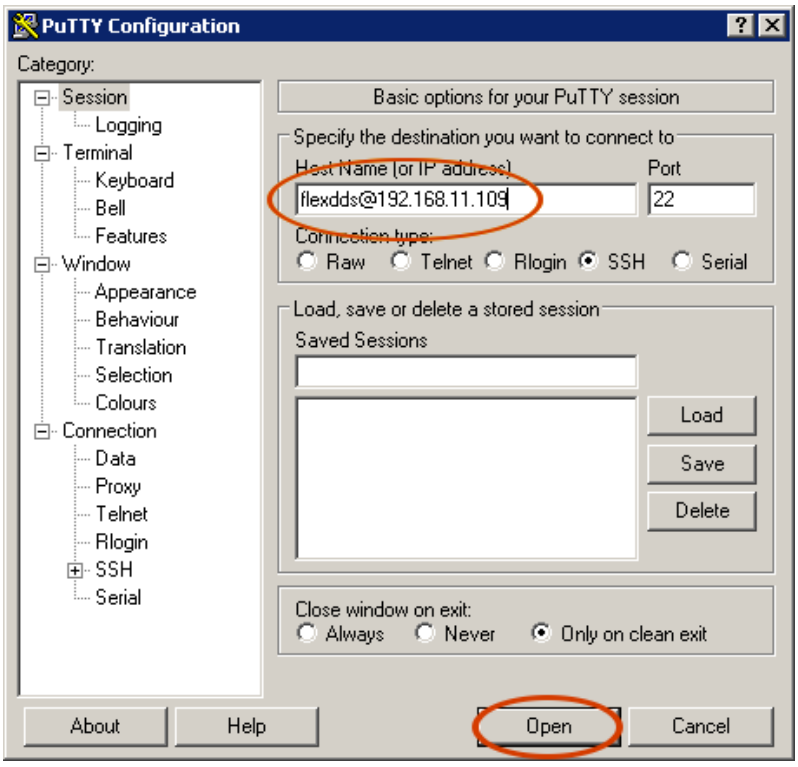
This is done by opening a terminal session with the FlexDDS-NG Rack over the network via SSH.

You need a SSH client such as **Putty** from http://www.putty.org.

Launch Putty, and enter "**flexdds@1.2.3.4**" below "Host name or IP address" as shown on the right. No spaces. Be sure to use the correct IP address in your network instead of "1.2.3.5".

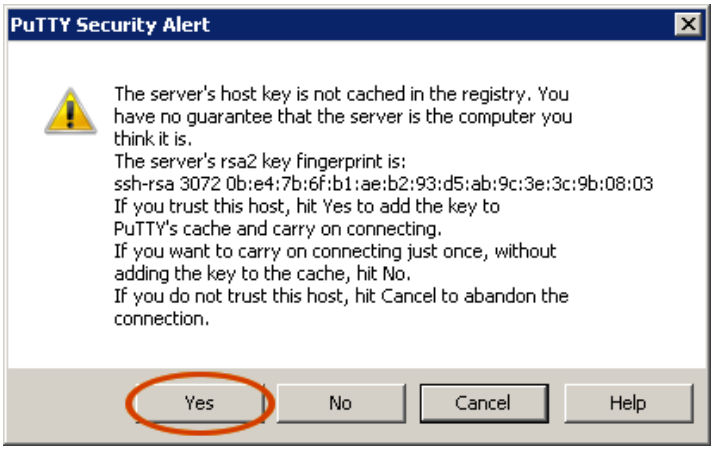
Finally, click "**Open**" on the bottom of the dialog.

(You can enter a name below "Saved Sessions" and then click "Save" to create a saved session for future logins.)



Again, a security alert will appear if you connect for the first time.

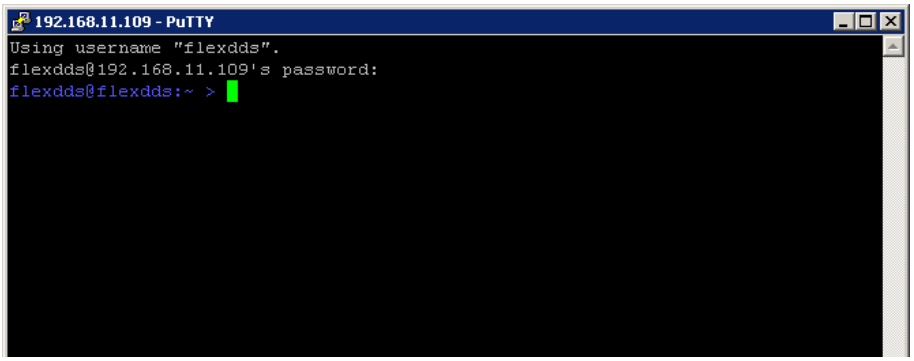
Click "**Yes**" to proceed.



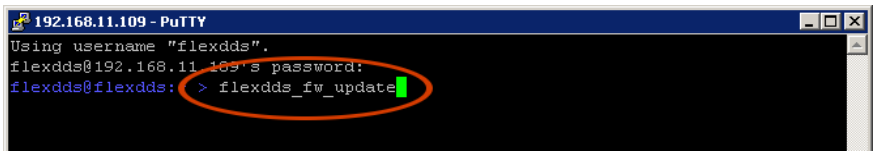
A new window will appear asking you for the password.

Type in "**mosei0Ke**" (with a zero before the "K") and hit enter.

You have now started a shell session on the FlexDDS-NG Rack (see image on the right).



Type in “**flexdds_fw_update**” and hit enter to start the firmware update process.

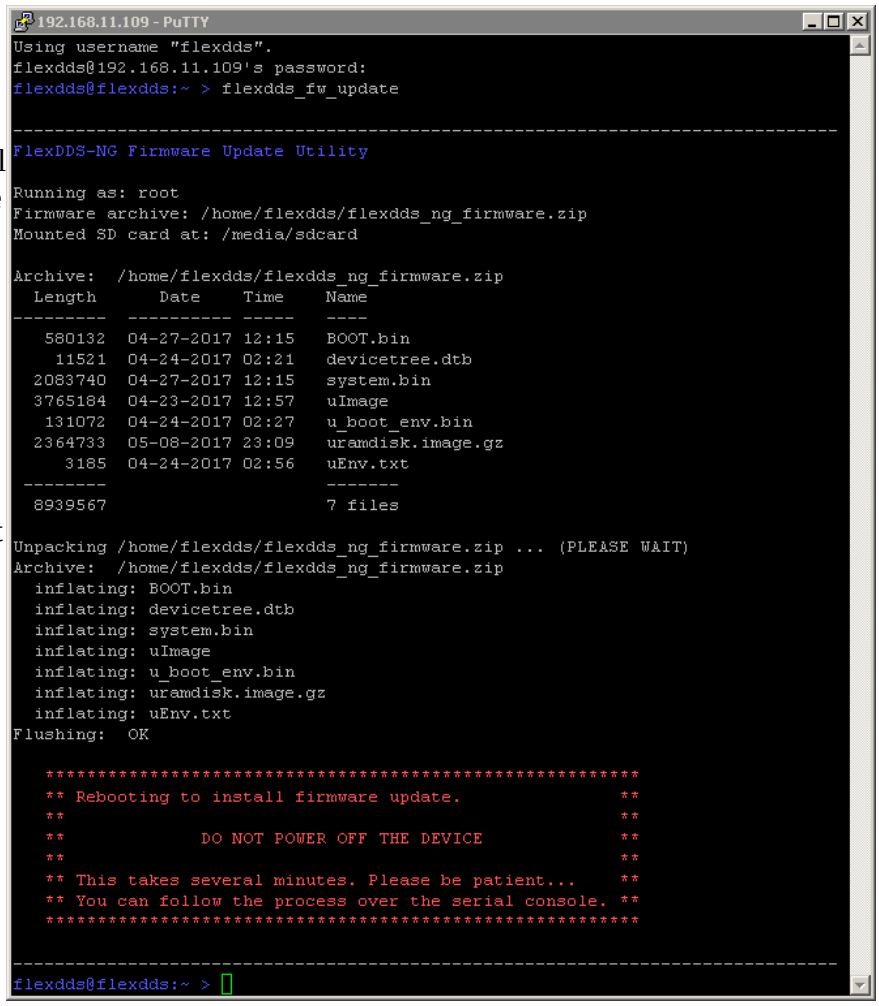


The power LED of the FlexDDS-NG Rack should start blinking.

Whatch the firmware update process in the window. A successful transcript should look similar to the screen shot on the right.

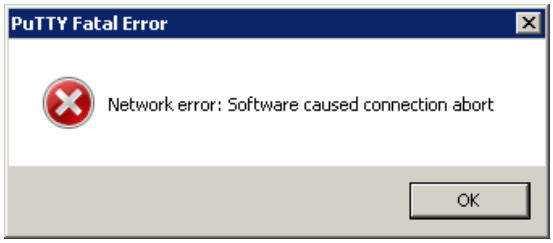
Do not close the window before the shell prompt appears again.

The FlexDDS-NG Rack will reboot itself in order to install the firmware update.



In a few moments, the shell session will terminate due to the reboot of the FlexDDS-NG Rack (see image on the right).
This is normal and expected.

Wait for the firmware update to complete.
This may take several minutes.
Do not power down the FlexDDS-NG Rack.



3. Wait for the firmware update to complete

You can now close the terminal. **Do not power off the FlexDDS-NG.**

The FlexDDS-NG Rack reboots itself and installs the firmware update while rebooting.

The green power LED will keep flashing until the firmware update is complete.

You can follow the firmware update steps on the USB console if you like (see part C).

C. Using the USB Console of the FlexDDS-NG Rack

The USB console allows you to do the following things:

- Watch the boot process of the FlexDDS-NG Rack including the actual firmware update.

- Obtain the network IP and MAC addresses of the FlexDDS-NG Rack.

You need to connect a regular USB cable from your host computer to the FlexDDS-NG Rack. Plug the cable into the USB receptable labeled "**USB Console**" on the FlexDDS-NG Rack.

Do not plug anything into the receptable labeled "USB Host" on the FlexDDS-NG Rack.

1a. Connecting to the USB console on a Linux host

The FlexDDS-NG Rack should show up automatically as a **/dev/ttyUSB*x*** device.

If you type "**dmesg**" into a terminal, the last lines are expected to look similar to this:

```
[17240869.461505] usb 3-11.2: new full-speed USB device number 84 using xhci_hcd
[17240869.557672] usb 3-11.2: New USB device found, idVendor=0403, idProduct=6001
[17240869.557679] usb 3-11.2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[17240869.557682] usb 3-11.2: Product: FlexDDS-NG Serial Console
[17240869.557684] usb 3-11.2: Manufacturer: Wieserlabs
[17240869.557687] usb 3-11.2: SerialNumber: A51FU9YD
[17240869.561698] ftdi_sio 3-11.2:1.0: FTDI USB Serial Device converter detected
[17240869.561758] usb 3-11.2: Detected FT232RL
[17240869.562064] usb 3-11.2: FTDI USB Serial Device converter now attached to ttyUSB0
```

The important parts were highlighted in bold blue. The driver for the FTDI serial chip is shipped with any recent Linux distribution.

Next, open a terminal and start **minicom**. You may have to install it first. Most Linux distributions have a readily built package for minicom that you can install directly from the distribution's package management tool (aptitude, yum, ...).

In order to start minicom, use the following command:

```
bash> minicom -w -c on -D /dev/ttyUSB0
```

Replace "ttyUSB0" with the actual device as found out via "dmesg" above.

In case it is not set up like that, be sure to configure minicom for a baud rate of 115200 with 8 bits, no parity, 1 stop bit. This setup is commonly called "**115200 8N1**" and usually the default. You can change all these settings in minicom's menu by pressing "**Ctrl+A**", then "**P**".

In the minicom window, you should now be able to press Return and see the login prompt of the FlexDDS-NG Rack:

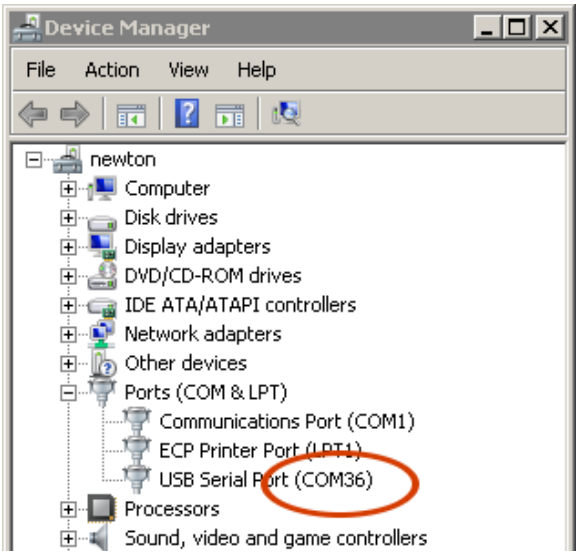
```
Welcome to FlexDDS-NG
flexdds login:
```

If you cannot, ensure that hardware flow control (**RTS/CTS**) is disabled. (FIXME: Describe how)

Skip 1b. and continue with 2.

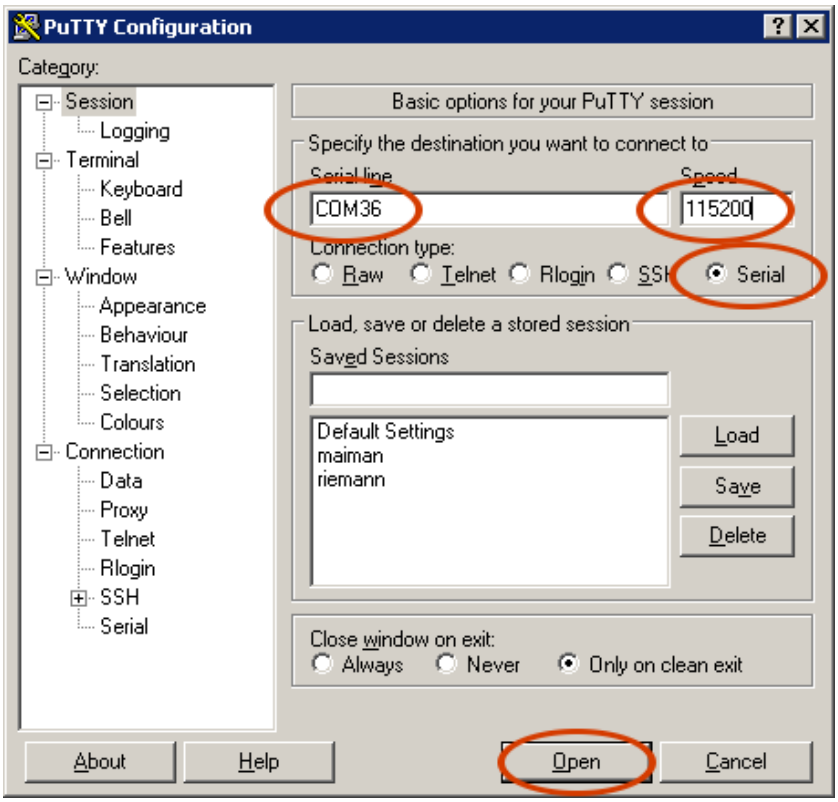
1b. Connecting to the USB console on a Windows host

Windows will usually install the drivers for the FTDI serial chip automatically and the connection should show up as **COM*x*** serial port in the device manager (see right).



If it does not, download the windows drivers for the FT232R chip from http://www.ftdichip.com.

You can use **Putty** to open the serial console. You will also need this program for step B.2 of the firmware update. It can be dowloaded from http://www.putty.org.



Launch Putty and configure it to connect to the serial port as show on the right:

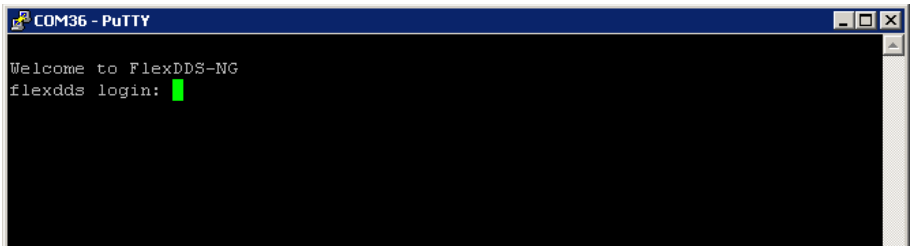
First, select "**Serial**".

Next, enter the COM port (as determined via the device manager) below "Serial line". This might be e.g. "**COM36**".

Finally, set the speed to "**115200**" and hit "**Open**" on the bottom of the dialog.

A new window should open which will appear completely empty.

Press return to see the login prompt of the FlexDDS-NG Rack.



2. Determining the network address

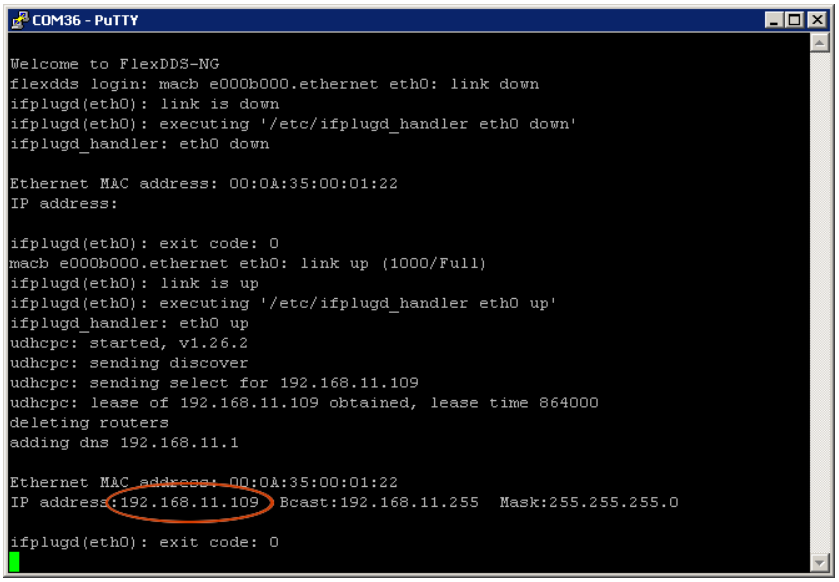
First, open a serial console as described in 1a or 1b. Then:

Remove the network cable if one is plugged in and wait 15 seconds.

Next, **plug in the network cable** into the receptable called "**Ethernet**" and wait 15 seconds.

NOTE: Do not plug any network cables into the receptable labeled "LVDS".

You should see log messages in the serial terminal similar to the ones in the image on the right.



Especially note the IP address.

Note: The FlexDDS-NG Rack expects to automatically configure its IP address via DHCP. If no IP address shows up, the FlexDDS-NG Rack might not receive a response from the DHCP server.

In this case, you need to configure the DHCP server to supply an IP address to the FlexDDS-NG.

It is recommended to configure the DHCP server to assign a static IP address to the FlexDDS-NG Rack. You will need the hardware MAC address for that. This MAC address is shown above the IP address (see image).