Package HD
Version 3.10.4

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1. Documentation For Package HD

1.1. HD - Support For Harddisks, Flash-Cards, USB-Sticks, ...

1.1.1. OPT_HDINSTALL - Installation On A Harddisk/CompactFlash

fli4l supports a large variety of boot media (CD, HD, Network, Compact-Flash,...). Floppy Disks are not supported anymore due to filesize regressions.

All steps necessary to install to a harddisk are explained below.

The usual way is installation via a physical boot medium. Installing via network boot is possible too. `OPT_HDINSTALL` prepares the harddisk. If boot medium and installation target share the same `BOOT_TYPE='hd'` installation files will be transferred immedeately. If direct transfer is not possible the files will be transferred later via scp or remote update using Imonc.

An Overview to the different harddisk installation variants A or B is found at the Beginning of the documentation for fli4l (Page ??). Please read carefully before proceeding!

HD-Installation In Six Simple Steps

1. create a bootable fli4l medium with package `BASE` and `OPT_HDINSTALL`. This medium must be able to perform remote updates. Either `OPT_SSHD` must be activated or `START_IMOND` is set to `'yes'`. If additional drivers not contained in the standard installation are necessary to access the harddisk, configure `OPT_HDDRV` as well.

2. boot the router with the installation medium.

3. log in to the router console and execute “hdinstall.sh”.

4. transfer the files syslinux.cfg, kernel, rootfs.img, opt.img and rc.cfg via scp or Imonc to the router’s /boot directory if prompted to. It is recommended to work with two fli4l directories, one for the setup and a second for the hd installation. In the HD version, set the variable `BOOT_TYPE='hd'` and for the boot media type according to its type.

   During remote update the files for the hd-version have to be copied!

5. unload boot medium, shut down the router and reboot again (by using halt/reboot/poweroff). The router will boot from harddisk now.

6. if problems occur please refer to the following text.

HD-Installation Explained In Detail (including examples)

First, a router boot media containing the installation scripts and additional drivers (eventually) has to be created. Activate `OPT_HDINSTALL` in config/hd.txt and `OPT_HDDRV` (only if additional drivers are needed). Please read the section on `OPT_HDDRV` thoroughly!

The variable `BOOT_TYPE` in base.txt has to be set in accordance with the chosen setup media. After all, a setup has to be performed... The variable `MOUNT_BOOT` in base.txt has to set to `'rw'`, in order to allow saving new archives (*. img) loaded over the network.

Then boot the router from this setup medium. Run the installation program by executing "hdinstall.sh" at the fli4l sonsole . After answering a few questions the installion on the hard drive is performed. Eventually you will be prompted to load files needed for the router via remote update.

Don't forget this remote update, otherwise the router won't boot from harddisk. To reboot the routers after remote update use reboot/halt/poweroff, otherwise your remote update changes will be lost.

The installation script may be started directly at the router console or via ssh from another PC. This way you have to log in by giving a password. As an ssh client you may use the freeware 'putty'.

Configuration Of The Setup Bootmedia

`BOOT_TYPE`	set according to type of bootmedia for the installation
`MOUNT_BOOT='rw'`	necessary to copy new archives (*.img) to the harddisk over network
`OPT_HDINSTALL='yes'`	necessary to have the setup script and tools for formatting of partitions on the bootmedia
(`OPT_HDDRV='yes'`)	only necessary if harddisk needs special drivers
`OPT_SSHD='yes'`	after preparation of the harddisk eventually files have to be copied via remote update. You will either need sshd, imond (`IMOND='yes'`) or another package allowing file transfers.

Table 1.1.: Configuration example of a setup media

At this point network configuration has to be completed in order to be able to copy files over the network later. Please do not activate DNS_DHCP at this point because this may cause all kinds of errors (the DHCP-server maybe already have a lease file for the router to be installed). For a remote update via scp (package SSHD) please set up `OPT_SSHD='yes'`. As an alternative you may transfer files via IMOND. This needs a complete and working configuration for DSL or ISDN. Please omit all packages not mentioned, i.e. no DNS_DHCP, SAMBA_LPD, LCD,Portforwarding a.s.o.

In case that the installations stops with the error message

```
*** ERROR: can't create new partition table, see docu ***
```

several problems may have occurred:

- harddisk is in use, maybe by an installation canceled before. Reboot and try again.

- additional drivers are needed, see OPT_HDDRV
- hardware problems, see appendix.

In the last step the final configuration files can be set up and all other packages needed may be added to the router.

Examples For Completed Installations Type A and B:

An example for each configuration is to be found in table 1.2.

BOOT_TYPE='hd'	necessary because we are booting from harddisk now
MOUNT_BOOT='rw|ro|no'	choose one. For copying new fli4l archives to harddisk over network 'rw' is needed.
OPT_HDINSTALL='no'	not needed after successful installation.
OPT_MOUNT	activate only if a data partition was configured
(OPT_HDDRV='yes')	only necessary if harddisk can't be used without additional drivers.

Table 1.2.: Example for an installation according to type A or B

Creation of a swap-partition will only be available if the router has less than 32MB RAM and the installation target is NO flash media!

1.1.2. OPT_MOUNT - Automatic Mounting Of Filesystems

OPT_MOUNT mounts data partitions created during installation to /data, file system checks will be performed automatically when needed. CD-ROMs will be mounted to /cdrom if a CD is inserted. For swap-partitions OPT_MOUNT is not needed!

OPT_MOUNT reads the configuration file hd.cfg on the boot-partition and mounts partitions mentioned there. If OPT_MOUNT was transferred via remote update to an already installed router this file has to be edited manually.

While booting from CD-ROM OPT_MOUNT can't be used. The CD may be mounted by setting MOUNT_BOOT='ro'.

The file hd.cfg on the DOS-partition for a router according to type B with swap and data partition looks like this (example):

```
hd_boot='sda1'
hd_opt='sda2'
hd_swap='sda3'
hd_data='sda4'
hd_boot_uuid='4A32-0C15'
hd_opt_uuid='c1e2bfa4-3841-4d25-ae0d-f8e40a84534d'
hd_swap_uuid='5f75874c-a82a-6294-c695-d301c3902844'
hd_data_uuid='278a5d12-651b-41ad-a8e7-97ccbc00e38f'
```

Just omit non-existent partitions, a router according to type A without further partitions looks like this:

```
hd_boot='sda1'
hd_boot_uuid='4863-65EF'
```

1.1.3. OPT_EXTMOUNT - Manual Mounting Of File Systems

OPT_EXTMOUNT mounts data partitions to any chosen mountpoint in file system. This allows to mount file systems created manually and for example provide a rsync-server directory.

EXTMOUNT_N Number of manually created data partitions to be mounted.

EXTMOUNT_x_VOLUMEID Device, label or UUID of the volume to be mounted. By executing 'blkid' device, label and UUID of all volumes can be displayed.

EXTMOUNT_x_FILESYSTEM The file system used for the partition. fli4l supports isofs, fat, vfat, ext2, ext3 und ext4 at the time of writing.
(The default setting `EXTMOUNT_x_FILESYSTEM='auto'` automatically tries to determine the file system used.)

EXTMOUNT_x_MOUNTPOINT The path (Mountpoint) to where the device should be mounted. It does not have to exist and will be created automatically.

EXTMOUNT_x_OPTIONS Specify special options to be passed to the 'mount' command here.

Example:

```
EXTMOUNT_1_VOLUMEID='sda2'        # device
EXTMOUNT_1_FILESYSTEM='ext3'      # filesystem
EXTMOUNT_1_MOUNTPOINT='/mnt/data' # mountpoint for device
EXTMOUNT_1_OPTIONS=''             # extra mount options passed via mount -o
```

1.1.4. OPT_HDSLEEP – Setting Automatic Sleep Mode For Harddisks

A harddisk can power down after a certain time period without activity. The disk will save power and operate quiet then. Accessing the harddisk will cause it to automatically spin up again.

Not all harddisks tolerate frequent spinup. Don't set the time for spindown too short. Older IDE-disks don't even have this function. This setting is also senseless for Flash-Media.

HDSLEEP_TIMEOUT The variable specifies after what time period without access the disk should power down. It will power down after that time period and come up again with the next access. Sleep timeouts can be specified in minutes from one to 20 and in periods of 30 minutes from half an hour up to 5 hours. A sleep timeout of 21 or 25 minutes will be rounded to 30 minutes. Some harddisks ignore values too high and stop after some minutes then. Please test the settings thoroughly because proper functioning depends on the hardware used!

```
HDSLEEP_TIMEOUT='2'             # wait 2 minutes until power down
```

1.1.5. OPT_RECOVER – Emergency Option

This variable determines if functions for creating an emergency option will be available. If activated the option copies the command “mkrecover.sh” to the router. By executing it you can activate the emergency option at the console. With package “HTTPD” installed the action of copying an existing installation to an emergency instance can be achieved conveniantly in the menu “recover”.

To use the recovery installation choose “r” for recovery in the boot menu at the next reboot.

```
OPT_RECOVER='yes'
```

1.1.6. OPT_HDDRV - Additional Drivers For Harddisk Controllers

By setting `OPT_HDDRV`=’yes’ you may activate drivers additionally needed. Generally this is NOT needed for IDE und SATA, package ’Base’ will load all necessary files.

HDDRV_N Set the number of drivers to be loaded.

HDDRV_x `HDDRV_1` a.s.o. Set drivers to be chosen for the host-adapters in use. A list of all supported adapters is provided with the initial config file for package hd.

HDDRV_x_OPTION With `HDDRV_x_OPTION` additional options can be passed that some drivers need for proper operation (for example an IO-address). This variable can be empty for the most drivers.

In the Appendix (Page 8) you may find an overview of the most common errors concerning harddisk and CompactFlash operation.

Example 1: Access to a SCSI-harddisk on an Adaptec 2940 controller

```
OPT_HDDRV='yes'             # install Drivers for Harddisk: yes or no
HDDRV_N='1'                 # number of HD drivers
HDDRV_1='aic7xxx'           # various aic7xxx based Adaptec SCSI
HDDRV_1_OPTION=''           # no need for options yet
```

Example 2: Accelerated IDE-Access with PC-Engines ALIX

```
OPT_HDDRV='yes'             # install Drivers for Harddisk: yes or no
HDDRV_N='1'                 # number of HD drivers
HDDRV_1='pata_amd'          # AMD PCI IDE/ATA driver (e.g. ALIX)
HDDRV_1_OPTION=''           # no need for options yet
```

A. Appendix For Package HD

A.1. HD - Possible Errors Concerning Hardisks/CompactFlashs

Problem:

- the router does not recognize the harddisk at all.

Possible Causes:

- the router lacks drivers for the hd-controller - additional drivers for the controller may be needed. Configure `OPT_HDDRV` in this case.
- BIOS entry for the disk is wrong.
- Controller is defective or switched off.
- wrong disk is configured for the installation
- Controller is not supported by fli4l. Some controllers may need special drivers not included with fli4l

Problem:

- Installation routine stops
- after a remote update of the opt-archive the router refuses to boot
- Error messages occur while partitioning or formatting the harddisk

Possible Causes:

- IDE harddisks can suffer from cables too long or unmatching
- older harddisks may suffer from wrong PIO mode or transfer rate settings in Bios (or controller) eventually being too fast for the disk.
- IDE-Chipset not suitable

Remarks:

- Problems with DMA eventually can be solved by setting `LIBATA_NODMA='no'`. (The default is 'yes'). This activates DMA with ATA devices.

Problem:

- fli4l doesn't boot from harddisk after the installation

Possible Cause:

- If booting from a CF module fails check if the CF was recognized as LBA or LARGE by the Bios. Correct setting for modules smaller than 512MB is NORMAL or CHS.
- an Adaptec 2940 Controller with an old BIOS is used and extended mapping for harddisks over 1GB is active. Update the Bios of the SCSI controller or switch mapping.
  By switching the mapping all data on the disk will be lost!

Problem:

- Windows error message while preparing of a CF-card: „Medium in drive (X:) contains no FAT. [Cancel]“.

Possible Cause:

- The card was removed from the reader too early / without unmounting. Windows did not finish writing and the file system is damaged. Prepare the CompactFlash again at the fli4l via HD-install.

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