



endace  
accelerated

# Linux FreeBSD Installation Guide

## Revision 8

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## Conventions Used in this Document

- Command-line examples suitable for entering at command prompts are displayed in mono-space courier font.

The hash # symbol at start of a line represents the prompt and is not entered as part of the command. Results generated by example command-lines are also displayed in mono-space courier font.

- Information relating to functions not implemented in this product beta version is underlined.
- The software version references such as 2.3.x, 2.4.x, 2.5.x are specific to Endace Measurement Systems and relate to Company software products only.

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## **1.0 PREFACE**

**Introduction** This manual describes the software installation process for the Endace 2.5.6.1 software release. The supported operating systems are Linux and FreeBSD.

The software can be installed either from a source tarball, or from the Endace Install CD. Further information about the Debian Linux distribution is available at the website <http://www.debian.org>.

This Guide is available when the installation CD is placed in a running Windows PC.

Installation of individual DAG cards and their configuration is described in their respective installation manuals that are also bundled on the Endace Install CD.

A complete guide to using and maintaining the Linux system is outside the scope of this manual.

The Endace 2.5.6.1 release software package includes the DAG device drivers, utility software, and documentation for installation onto Linux and FreeBSD systems.

**In this chapter** This chapter covers the following sections of information.

- Manual Purpose
- Endace Install CD
- DAG Software System Requirements

### **1.1 Manual Purpose**

**Description** The purpose of this manual is to describe:

- Linux DAG Software Installation
- FreeBSD DAG Software Installation
- Software Support

### **1.2 Endace Install CD**

**Description** There are two Endace Install CDs shipped with products. One CD is bootable that contains a Debian Linux ISO image from which the Debian Linux operating system is installed.

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## 1.2 Endace Install CD, continued

**CD folders** The second CD auto-runs when placed in a running Windows PC and displays the DAG card user manuals and the software installation manuals. Physically browsing the CD will display four folders consisting of:

1. contrib
2. docs
3. Linux-FreeBSD
4. Windows

The contrib folder holds all applications. The docs folder contains the latest documentation. The Linux-FreeBSD folder contains the 2.55 tarball which is only required if the Linux operating system is running.

If the Linux or FreeBSD operating system is not installed on the PC to be used, a copy of the Debian Linux distribution is available on the CD shipped with DAG cards. Installation instructions are also available at the website <http://www.debian.org>.

The Endace 2.5.6.1 DAG software tarball can be sourced from the CD or from the Endace Secure Support website <http://www.endace.com/secureLogin.htm>.

## 1.3 DAG Software System Requirements

**Description** The minimum system requirements for Endace 2.5.x software package are:

- PC, at least Pentium II 400 MHz, Intel 440BX, GX or newer chipset
- Minimum of 128 MB RAM
- 30MB free hard disk space
- Approximately 6 GB hard disk space for Debian Linux (optional)

For installation and run problems contact Endace support at [support@endace.com](mailto:support@endace.com)

## 1.4 Print Document

**Description** It is recommended that this document be printed and bound or stapled for self-study and reference purposes during the installation process.

## **2.0 LINUX DAG SOFTWARE INSTALLATION**

**Introduction**      The Linux operating system must be installed before the DAG software. The process then involves installing, compiling, and configuring DAG drivers and software package.

**In this chapter**      This chapter covers the following sections of information.

- Upgrade to 2.5.x Installation from 2.4.x
- Installing DAG Software for Linux System
- Install DAG Drivers

### **2.1 Upgrade to 2.5.x Installation from 2.4.x**

**Additional Steps Required**      If the Linux PC has previously been used with a 2.4.x software package, some additional steps are required in order to remove the 2.4.x installation before the 2.5.5 installation can be used. The following steps are not required when using FreeBSD.

**Procedure**      Follow these steps to remove the Linux 2.4.x package.

**Step 1. Determine the running kernel version**

The kernel version is given by the command `uname -r`.

**Step 2. Remove the 2.4.x kernel modules**

Remove the 2.4.x kernel modules with the command:

```
rm /lib/modules/kernel version/misc/dag*
```

For example if the kernel version is 2.4.21smp:

```
rm /lib/modules/2.4.21smp/misc/dag*
```

**Step 3. Remove the 2.4.x tools**

The compiled tools from the 2.4.x package must be removed from the executable path. For example, if the tools are run from the location `/root/dag/bin`:

```
rm /root/dag/bin/*
```

If the tools are run from the location `/usr/local/bin`:

```
rm /usr/local/bin/dag*
```

---

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## 2.1 Upgrade to 2.5.x Installation from 2.4.x, continued

### Procedure, continued

#### Step 4. Reboot

After removing the 2.4.x kernel driver modules, reboot the system.

## 2.2 Installing DAG Software for Linux System

**Description** The DAG software and drivers function with the Linux operating system, with a kernel in the 2.4.x or 2.6.x series. For security reasons, the newest available kernel is to be used.

The software and drivers have been tested using Debian Linux, FreeBSD and RedHat Enterprise Linux 3.0. Other Linux platforms should also work. Due to the diversity of Linux systems, it is impossible to test all distributions.

**Kernels** Kernel patches are not required to use DAG cards. However, compiling a kernel for a system's specific devices is a good practice.

For the installation process it is assumed a C development environment is available, that is `tar`, `gcc`, `make`, and header files.

The `readline` and `readline-dev` packages need to have been installed. These are optional packages in Debian Linux and not part of the default installation.

**Configure kernel sources** To compile the device drivers, a configured set of kernel sources must be configured for the kernel being used. This consists of at least an unpacked kernel source tree under `/usr/src/linux` that has been configured and `make dep` has been run.

## 2.2 Installing DAG Software for Linux System, continued

**In this section** This section covers the following topics of information.

- Unpack Tarball
- Compile Software

### 2.2.1 Unpack Tarball

**Description** The DAG installation is usually provided as a compressed tar file, such as `dag-2.5.x-linux.tar.gz`.

Firmware and FPGA sources are not available, contact customer support for customization or special requirements by email [support@endace.com](mailto:support@endace.com).

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## 2.2.1 Unpack Tarball, continued

**Procedure** Follow these steps to create the `dag` directory.

### Step 1. Untar Installation

Move to directory `/usr/local`, and untar the installation.

The top-level directory created is called `dag-2.5.x`.

### Step 2. Create a symlink to the Unpacked Source

Create a symlink called `dag` to the unpacked source directory. For example:

```
ln -s dag-<version name> dag
```

### Step 3. Continue Installation

Move into the `dag` [symlink] directory.

#### Sub-directories:

<code>doc</code>	Documentation in PDF format
<code>drv</code>	Driver source
<code>filtering</code>	Hardware IP filtering utilities
<code>include</code>	Header files for C and assembler code
<code>lib</code>	Library to access DAG card
<code>scripts</code>	Example DAG initialization scripts
<code>tools</code>	DAG capture tools and utilities
<code>xilinx</code>	Xilinx images for download

Firmware and FPGA sources are not available.

Contact [support@endace.com](mailto:support@endace.com) for customisation or special requirements.

## 2.2.2 Compile Software

**Description** The DAG software distribution type for Linux is supplied with a `configure` script, which can take these arguments:

<code>--prefix=PREFIX</code>	Architecture independent install path prefix Default is <code>/usr/local</code>
<code>--exec-prefix=EPREFIX</code>	Architecture specific install path prefix
<code>--with-kern=DIR</code>	override automatic kernel source detection
<code>--with-config=FILE</code>	override automatic kernel <code>.config</code> file detection
<code>--with-pcap=DIR</code>	override automatic pcap header detection
<code>--disable-gcc-detect</code>	override automatic gcc kernel compiler detection

Based on kernel version currently running, the `configure` script attempts to find a kernel source tree and `.config` file first.

The detected version is always displayed in the output of `configure`.

**Procedure** Follow these steps to compile software.

### Step 1. Enter Script

Type:

```
./configure
make depend
make
```

### Step 2. Make Script

The following five [phoney] targets within the top-level `Makefile` are useful:

<code>make all</code>	Builds everything
<code>make clean</code>	Deletes everything generated by build process
<code>make distclean</code>	Deletes everything generated by both build and configuration process, it should return to start point with just-unpacked tarball. Begin the process again with <code>./configure</code> .
<code>make install</code>	Installs tools, utilities, and drivers
<code>make depend</code>	Creates dependencies required by <code>make</code> .

Dependencies are necessary to avoid `make` complaining about missing include files.

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## 2.2.2 Compile Software, continued

### Procedure, continued

#### Step 3. Resolve Library Path Conflicts

The `libdag` library installs by default into `/usr/local/lib`

On some Linux distributions this directory is not scanned as part of the default library path. This can lead to problems for programs using shared library version of `libdag`.

Two methods to resolve path conflict are:

- For those using `libdag` shared library. In bash, set environment variable to:

```
LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/local/lib. This can be added to user's login file for automation.
```

- Make library available to all users by adding `usr/local/lib` to system library path by editing `/etc/ld.so.conf` file. In this case, run `ldconfig` to update library cache.

## 2.3 Install DAG Drivers

**RAM allocation** The DAG system uses host PC memory for each DAG card's capture buffer. At least 8 MB per card of RAM is set aside for each DAG card in the system, with each card allocated the same amount.

In the following procedure, follow Step 1 to enable `dagmem` automatic load or Step 2 to enable RedHat Linux automatic load.

**Dagmem driver** The DAG software uses a new mechanism to reserve memory. A driver known as `dagmem` loads when the kernel is booted, it determines the number of DAG cards installed in the system, and reserves memory for each card.

**Installing dagmem driver** After compilation, the `dagmem` driver is installed in the running kernel's modules directory.

**Description** The `dagmem` driver can be unloaded to release reserved memory for general use, `rmmod dagmem`

The memory reserved by `dagmem` driver is not available to other processes on the host computer, even when `dag` driver is not loaded. Once unloaded, memory fragmentation may make it impossible to reload `dagmem` without rebooting the computer.

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## 2.3 Install DAG Drivers, continued

**Procedure** Follow these steps to install Linux drivers.

### Step 1. Enable dagmem Automatic Load in Debian Linux

To enable automatic load of the dagmem driver on reboots in Debian Linux, edit file `/etc/modules` to add an entry for dagmem.

The amount of memory reserved per card can be changed to 64MB for example by appending an option as follows:

```
dagmem dsize=64M
```

NOTE: Follow Step 2 if the dagmem Automatic Load is being enabled for RedHat Linux.

### Step 2. Enable RedHat Linux Automatic Load in RedHat Linux

To enable automatic load of the dagmem driver on reboots in RedHat Linux, edit file `/etc/rc.modules` to add an entry for dagmem:

```
#!/bin/sh  
modprobe dagmem
```

The amount of memory reserved per card can be changed to 64MB for example by appending the option `dsize=X`:

```
modprobe dagmem dsize=64M
```

NOTE: Follow Step 1 if the dagmem Automatic Load is being enabled for Debian Linux.

### Step 3. Reboot Computer

On computer reboot, a message from dagmem should display during boot process reporting number of DAG cards in the system and amount of memory successfully reserved per card.

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## 2.3 Install DAG Drivers, continued

### Procedure, continued

#### Step 4. Respond to File System Check

When the Linux host computer boots, it may perform a file system check, or fsck.

This occurs before dagmem driver is loaded, and often fragments memory to the extent that sufficient contiguous memory is not available. This causes DAG driver loading to fail. The Linux operating system requires another reboot.

With no filesystem errors, the fsck will not reoccur and the dagmem driver will load normally.

#### Step 5. Set DAG capture buffer memory

The maximum amount of memory used for DAG capture buffers depends on the host computer architecture and Linux kernel memory model selected at compile-time.

A total of 512MB or more may be shared between all DAG cards in a system, but such large buffers are seldom beneficial.

#### Step 6. Manually Load dag Driver

Once dagmem is configured and loaded, the dag driver is loaded manually with `drv/dagload`. As the driver uses a dynamic major number, the `dagload` script is used rather than `insmod` or `modprobe`.

#### Step 7. Check Card Reports

Each card's presence and resource usage is reported.

The driver should display messages on screen, or write to system log depending on the environment, reporting number of DAG cards found, their interrupt and I/O address assignments as well as location and size of reserved memory buffer.

The following example is for a DAG 4.3 and DAG 3.8 card installed.

```
dag: Version 2.5.0
dag: dag0 found Dag 4.3 Rev 0 at 0xfc200000 irq 48 buf 64MB
dag0: starting duck at 1077744347.000000
dag: dag1 found Dag 3.8 Rev 1 at 0xfc400000 irq 72 buf 64MB
dag1: starting duck at 1077744348.000000
```

#### Step 8. Set dag Driver to Load Automatically

Setting the dag driver to load automatically on system boot up depends on the Linux distribution used.

## **3.0 FREEBSD DAG SOFTWARE INSTALLATION**

- Introduction**      The Endace 2.5.5 software package includes built-in FreeBSD support. The FreeBSD software configuration for DAG cards consists of:
- Installing and configuring FreeBSD on host computer
  - Installing, compiling, and configuring the DAG drivers and software

The FreeBSD drivers should work on any FreeBSD 4.x installation.

If not already installed, FreeBSD can be installed from official sources, followed by installing the Endace package from a tarball.

The Endace 2.5.6.1 DAG drivers and software source package can be retrieved by secure login on Endace's website,  
<http://www.endace.com/secureLogin.htm>.

- In this chapter**      This chapter covers the following sections of information.
- Install Endace DAG Software for FreeBSD System
  - Configure DAG Software for FreeBSD System

### **3.1 Install Endace DAG Software for FreeBSD System**

- Description**      The DAG software and drivers work with FreeBSD 4.x series operating system. The software and drivers have been tested using the 4.11 distribution, other 4.x versions should work.

The latest FreeBSD 4.x series release should be used for security reasons.

- Kernel patches**      No kernel patches are required to use DAG cards, compiling a kernel for the system's specific devices is recommended.

- C development environment**      It is assumed for installation purposes there is a C development environment available, that is `tar`, `gcc`, `make`, `gmake`, and kernel sources.

- Procedure**      Follow these steps to create the `dag` directory.

**Step 1.      Untar Installation File**

Move to directory `/usr/local` and `untar` the installation from which a top-level directory is created and named `dag-2.5.5`

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## 3.1 Install Endace DAG Software for FreeBSD System, continued

### Procedure, continued

#### Step 2. Create Top Level Directory Symlink

Name symlink as 'dag'. For example, if DAG software will be accessed from /usr/local directory in which it has been installed, type:

```
ln -s dag-<version name> dag
```

#### Step 3. Proceed With Installation

Move into the dag (symlink) directory to proceed with the installation.

##### Sub-directories:

doc	Documentation in PDF format
drv	Driver source
filtering	Hardware IP filtering utilities
include	Header files for C and assembler code
lib	Library to access DAG card
scripts	Example DAG initialization scripts
tools	DAG capture tools and utilities
xilinx	Xilinx images for download

NOTE: Firmware and FPGA sources are not available, for customisation or special requirements contact [support@endace.com](mailto:support@endace.com).

#### Step 4. Configure Script Arguments

The DAG software distribution has a `configure` script, which can take the following arguments:

<code>--prefix=PREFIX</code>	Architecture independent install path prefix. Default is /usr/local
<code>--exec-prefix=PREFIX</code>	Architecture specific install path prefix. Default is PREFIX
<code>--with-sysmod=DIR</code>	Location of kmod sources. Default is /sys/modules.
<code>--with-pcap=DIR</code>	Override automatic pcap header detection.

---

*Continued on next page*

## 3.1 Install Endace DAG Software for FreeBSD System, continued

### Procedure, continued

#### Step 5. Install DAG Software Distribution

Type in:

```
./configure
gmake
gmake install
cd /sys/modules/dagmem
make
make install
cd /sys/modules/dag
make
make install
make nodes
```

The first two commands, `./configure` and `gmake`, can be executed as a normal user. The remaining commands must be executed as the superuser.

#### Step 6. Make Script

The following five [phoney] targets within the top level `Makefile` are useful:

<code>gmake all</code>	Builds everything.
<code>gmake clean</code>	Deletes everything generated by the build process
<code>gmake distclean</code>	Deletes everything generated by both build and configuration process, it should return to start point with the just-unpacked tarball.
	Begin again with <code>./configure</code> .
<code>gmake install</code>	Installs tools, utilities, libraries, drivers and such like.
<code>gmake depend</code>	Creates dependencies required by <code>gmake</code> . Dependencies are necessary to avoid <code>gmake</code> complaining about missing include files.

The `make install` target installs files in the following locations.

Documentation:	<code>PREFIX/share/doc/dag</code>
Firmware:	<code>PREFIX/share/dag/xilinx</code>
Binaries:	<code>EPREFIX/bin</code>
Libraries:	<code>EPREFIX/lib</code>
Headers:	<code>PREFIX/include</code>
Drivers:	<code>/sys/modules/dag, dagmem</code>

## 3.2 Configure DAG Software for FreeBSD System

**Description** The DAG system uses memory in the host PC for each DAG card's capture buffer. The default is 32MB per card. After compilation, the dagmem driver is installed.

The memory reserved by the dagmem driver is not available to other processes on the host computer, even when the dag driver is not loaded. The reserved memory may be released for general use by unloading the dagmem driver, but once unloaded memory fragmentation may make it impossible to reload dagmem without rebooting the computer.

The DAG driver is loaded following dagmem configuration.

**Procedure** Follow these steps to configure Endace 2.5.x DAG drivers for FreeBSD system.

**Step 1. Set FreeBSD to Auto-load dagmem Driver**

For dagmem driver to auto-load on reboots, edit file `/boot/loader.conf` and add line

```
dagmem_load="YES"
```

**Step 2. Set FreeBSD to Auto-load dag Driver**

The dag driver can also auto-loaded; it should be loaded after the dagmem driver.

**Step 3. Adjust Memory Card**

The amount of memory reserved per card can be changed to 64MB by adding the following option in `/boot/loader.conf` file:

```
dagmem_size="67108864"  
dagmem_load="YES"
```

**Step 4. Reboot Computer**

A message should display during booting indicating dagmem has loaded.

---

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## 3.2 Configure DAG Software for FreeBSD System, continued

### Procedure (continued)

#### Step 5. Release Memory as Required

The following example is for a machine with a DAG 3.8 card installed.

```
Preloaded elf module "dagmem.ko" at 0xc052009c.
```

```
dagmem0: <Endace Dag 3.8> 64MB at virt 0xdd34000 phys  
0x600000
```

NOTE: The maximum amount of memory that can be used for the DAG capture buffers depends on the host computer architecture. A total of 512MB or more may be shared between all DAG cards in a system.

#### Step 6. Load dag Driver

This can be done:

In `/boot/loader.conf` as described in Step 1, or with command `make load` in `/sys/modules/dag`.

NOTE: The driver should display messages on-screen, or write to the system log depending on the environment. The output reports number of DAG cards found, their interrupt and I/O address assignments.

```
dag0: <Endace Dag 3.8> mem 0xfc200000-0xfc20ffff irq 11 at  
device 1.0 on pci2  
dag0: starting duck at 1077747319.000005
```

#### Step 7. Set path to EPREFIX/bin Directory

Edit environment scripts `.bashrc` to include path to directory.

## **4.0 SOFTWARE SUPPORT**

**Introduction** The support provided by Endace Technology includes software upgrades, programming with DAG, and actions to take when there is trouble with the software.

**In this chapter** This chapter covers the following sections of information.

- Upgrade Software
- Programming with DAG
- Trouble, Cause, Corrective Actions

### **4.1 Upgrade Software**

**Description** Software updates are available periodically from Endace which may add features or fix problems.

For those with a support contract, the software updates can be accessed using support login at the Endace website, <http://www.endace.com/secureLogin.htm>.

To subscribe to mailing list for automatic notification of software updates and documentation, contact [support@endace.com](mailto:support@endace.com)

The following installation procedure for new software releases ensures upgrading is easy and consistent.

Should for any reason, a new release not work on a host facility, the change back to the previous release is achieved by pointing symlink back to the previous version.

**Procedure** Follow these steps to upgrade software.

**Step 1. Compile Device Driver**

A configured set of kernel sources must exist for the kernel being used.

This consists of an unpacked kernel source tree under `/usr/src/linux` that has been configured and `make dep` has been run.

**Step 2. Unpack New Release**

Move to directory where previous DAG version was unpacked. This may be `/usr/local` or `/root`.

Unpack the new release which creates a new directory, `dag-<new version>`.

---

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## 4.1 Upgrade Software, continued

Procedure (continued)

### Step 3. Edit Symlink

Edit the symlink to point to new release. For example, type

```
ln -s dag-<new version> dag
```

### Step 4. Continue Installation

Move into the dag [symlink] directory.

Proceed with installation following the steps in Chapter 2.0 for Linux, or Chapter 3.0 for FreeBSD.

## 4.2 Programming with DAG

**Description** All DAG cards present a common C language API for user programs.

The API under 2.5.x is under active development and may change between minor releases.

Further details about the API can be requested by emailing [support@endace.com](mailto:support@endace.com) for a copy of the DAG Programming Guide.

## 4.3 Trouble, Cause, Corrective Actions

**Description** Support is provided with a service contract. If problems with a DAG card or supplied software, contact Endace Technical Support via the email address [support@endace.com](mailto:support@endace.com). Supplying sufficient information about trouble enables causation to be quickly identified and corrective actions advised.

**Problem checklist** The exact information available to users for trouble, cause and correction analysis may be limited by nature of the problem. The following items assist a quick problem resolution:

Ref	Item
1.	DAG card[s] model and serial number.
2.	Host PC type and configuration.
3.	Host PC operating system version.
4.	DAG software version package in use.
5.	Any compiler errors or warnings when building DAG driver or tools.
6.	Messages generated when DAG device driver is loaded. These can be collected from command <code>dmesg</code> or from log file <code>/var/log/syslog</code> .
7.	Output of <code>daginf</code> .
8.	Firmware versions from <code>dagrom -x</code> .
9.	Physical layer status reported by: <ul style="list-style-type: none"><li>• <code>dagthree</code> for DAG 3 series cards</li><li>• <code>dagfour</code> for DAG 4 series cards</li><li>• <code>dagsix</code> for DAG 6 series cards.</li></ul>
10.	Network link statistics reported by: <ul style="list-style-type: none"><li>• <code>dagthree -si</code> for DAG 3 series cards</li><li>• <code>dagfour -si</code> for DAG 4 series cards</li><li>• <code>dagsix -si</code> for DAG 6 series cards</li></ul>
11.	Network link configuration from the router where available.
12.	Contents of any scripts in use.
13.	Complete output of session where error occurred including any error messages from DAG tools. The <code>typescript</code> Unix utility may be useful for recording this information.
14.	A small section of a captured packet trace illustrating the problem.