

Linux Fast-STREAMS

Installation and Reference Manual

Version 0.7a Edition 3
Updated 2005-09-14
Package streams-0.7a.3

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The OpenSS7 Project <<http://www.openss7.org/>>

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Contributors

The primary contributor to the OpenSS7 Linux Fast-STREAMS package is **Brian F. G. Bidulock**. The following is a list of significant contributors to **The OpenSS7 Project**:

- Per Berquist
- John Boyd
- Chuck Winters
- Peter Courtney
- Tom Chandler
- Gurol Ackman
- Kutluk Testicioglu
- Others

1 Introduction

This manual documents the design, implementation, installation, operation and future development schedule of the Linux Fast-STREAMS package.

1.1 Notice

This package is released and distributed under the *GNU General Public License* (see [Section A.1 \[GNU General Public License\], page 53](#)). Please note, however, that there are different licensing terms for the manual pages and some of the documentation (derived from X/Open publications and other sources). Consult the permission notices contained in the documentation for more information.

This document, is released under the *GNU Free Documentation License* (see [Appendix B \[Documentation License\], page 59](#)) with all sections invariant.

1.2 Overview

This manual documents the design, implementation, installation, operation and future development of the Linux Fast-STREAMS package.

1.3 Organization of this Document

This document is organized (loosely) into several sections as follows:

Chapter 1 [Introduction], page 3.	This introduction
Chapter 2 [Objective], page 5.	Objective of the package
Chapter 3 [Reference], page 7.	Contents of the package
Chapter 4 [Conformance], page 9.	Conformance of the package
Chapter 5 [Releases], page 13.	Releases of the package
Chapter 6 [Installation], page 17.	Installation of the package
Chapter 7 [Troubleshooting], page 51.	Troubleshooting of the package

1.4 Conventions and Definitions

This manual uses *texinfo* typographic conventions.

2 Objective

Linux Fast-STREAMS is intended as a high-performance, production replacement for *Linux STREAMS (LiS)*. *Linux Fast-STREAMS* has the following features in contrast to *Linux STREAMS*:

Linux Fast-STREAMS

LiS

Provided and optimized for Linux.

Maintains portability across Linux, User Space, QNX, DOS and other ports.

Promotes mainstream kernel adoption.

Places portability concerns before mainstream kernel adoption.

Lindented and follows normal kernel formatting and coding practices.

Non-lindented, does not follow normal kernel formatting and coding practices.

Provides compatibility modes for AIX, HPUNIX, OSF, Solaris, UnixWare, SVR 4.2 and LiS. Supports all major SVR 4.2 variants.

Provides some compatibility interfaces but also many Linux-derived interfaces specific to LiS.

Licensed under GPL with commercial licensing available.

Dubiously licensed under LGPL (yet parts are GPL).

Supports full SVR 4.2 ES/MP synchronization models.

Supports only single, Linux derived synchronization models.

Runs at SoftIRQ. By running at SoftIRQ, Linux Fast-STREAMS ensures that its place within the scheduling network-based events is appropriate for the Linux kernel.

Separate kernel threads.

Provides common SVR 4.2 system tunable parameters and system controls as well as /proc filesystem for support and debugging.

Provides only log-based debugging.

Provides support for SVR 4.2 STREAMS and other utilities.

Provides limited set of LiS only Linux-derived utilities.

Provides full named-streams device and device filesystem support.

Provides only character-based node support.

3 Reference

3.1 Files

```
'specfs.o'  
'streams.o'  
'streams-aixcompat.o'  
'streams-hpuxcompat.o'  
'streams-liscompat.o'  
'streams-osfcompat.o'  
'streams-suncompat.o'  
'streams-svr4compat.o'  
'streams-uw7compat.o'
```

3.2 Drivers

The configuration of *STREAMS* drivers and modules is performed when compiling the **Linux Fast-STREAMS** subsystem. The *STREAMS* subsystem, core drivers and modules are part of every **Linux Fast-STREAMS** system.

The following sections list the core drivers and modules, *STREAMS* kernel tunable parameters, and *STREAMS* configuration information.

```
'streams-clone.o ("clone")'  
    Clone device driver.  
  
'streams-echo.o ("echo")'  
    Echo (loopback) device driver.  
  
'streams-fifo.o ("fifo")'  
    FIFO (Named Pipe) driver.  
  
'streams-log.o ("strlog")'  
    STREAMS log driver.  
  
'streams-nsdev.o ("nsdev")'  
    Named STREAMS device driver.  
  
'streams-nuls.o ("nuls")'  
    Null stream driver.  
  
'streams-pipe.o ("pipe")'  
    Pipe driver.  
  
'streams-sad.o ("sad")'  
    STREAMS Administrative Driver.
```

3.3 Modules

The configuration of *STREAMS* drivers and modules is performed when compiling the **Linux Fast-STREAMS** subsystem. The *STREAMS* subsystem, core drivers and modules are part of every **Linux Fast-STREAMS** system.

The following sections list the core drivers and modules, *STREAMS* kernel tunable parameters, and *STREAMS* configuration information.

`'streams-connld.o ("connld")'`

Connld module.

`'streams-pipemod.o ("pipemod")'`

Pipe module.

`'streams-sc.o ("sc")'`

STREAMS configuration module.

`'streams-sth.o ("sth")'`

Stream Head module.

Additional modules are provided by add-on packages.

3.4 Libraries

3.5 Utilities

3.6 Development

For development using the *streams* package, See [section “About This Manual” in *STREAMS Programmer’s Guide*](#).

4 Conformance

4.1 STREAMS Compatibility

Linux Fast-STREAMS provides some degree of compatibility with other *STREAMS* implementation as follows:

— *SVR 4.2 ES/MP*

Linux Fast-STREAMS provides some degree of operational compatibility with *SVR 4.2 ES/MP* to ease portability and common comprehension, see [section “SVR 4.2 Compatibility” in *STREAMS Programmer’s Guide*](#).

— *AIX 5L Version 5.1*

Linux Fast-STREAMS provides some degree of operational compatibility with *AIX 5L Version 5.1* to ease portability and common comprehension, see [section “AIX Compatibility” in *STREAMS Programmer’s Guide*](#).

— *HP-UX 11.0i v2*

Linux Fast-STREAMS provides some degree of operational compatibility with *HP-UX 11.0i v2* to ease portability and common comprehension, see [section “HP-UX Compatibility” in *STREAMS Programmer’s Guide*](#).

— *OSF/1 1.2/Digital UNIX/True 64*

Linux Fast-STREAMS provides some degree of operational compatibility with *OSF/1 1.2/Digital UNIX* to ease portability and common comprehension, see [section “OSF/1 Compatibility” in *STREAMS Programmer’s Guide*](#).

— *UnixWare 7.1.3 (OpenUnix 8)*

Linux Fast-STREAMS provides some degree of operational compatibility with *UnixWare 7.1.3 (OpenUnix 8)* to ease portability and common comprehension, see [section “UnixWare Compatibility” in *STREAMS Programmer’s Guide*](#).

— *Solaris 9/SunOS 5.9*

Linux Fast-STREAMS provides some degree of operational compatibility with *Solaris 9/SunOS 5.9* to ease portability and common comprehension, see [section “Solaris Compatibility” in *STREAMS Programmer’s Guide*](#).

— *SUPER-UX*

Linux Fast-STREAMS provides some degree of operational compatibility with *SUPER-UX* to ease portability and common comprehension, see [section “SUX Compatibility” in *STREAMS Programmer’s Guide*](#).

— *UXP/V*

Linux Fast-STREAMS provides some degree of operational compatibility with *UXP/V* to ease portability and common comprehension, see [section “UXP Compatibility” in *STREAMS Programmer’s Guide*](#).

— *LiS-2.16.18*

Linux Fast-STREAMS provides some degree of operational compatibility with *LiS 2.16* to ease portability and common comprehension, see [section “LiS Compatibility” in *STREAMS Programmer’s Guide*](#).

For additional details, see [section “About This Manual” in *STREAMS Programmer’s Guide*](#).

4.2 Porting

— SVR 4.2 ES/MP

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *SVR 4.2 ES/MP* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from SVR 4.2 MP” in *Linux Fast-STREAMS Porting Guide*.

— AIX 5L Version 5.1

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *AIX 5L Version 5.1* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from AIX 5L Version 5.1” in *Linux Fast-STREAMS Porting Guide*.

— HP-UX 11.0i v2

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *HP-UX 11.0i v2* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from HP-UX 11.0i v2” in *Linux Fast-STREAMS Porting Guide*.

— OSF/1 1.2/Digital UNIX/True 64

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *OSF/1 1.2/Digital UNIX/True 64* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from OSF/1 1.2/Digital UNIX” in *Linux Fast-STREAMS Porting Guide*.

— UnixWare 7.1.3 (OpenUnix 8)

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *UnixWare 7.1.3 (OpenUnix 8)* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from UnixWare 7.1.3 (OpenUnix 8)” in *Linux Fast-STREAMS Porting Guide*.

— Solaris 9/SunOS 5.9

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *Solaris 9/SunOS 5.9* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from Solaris 9/SunOS 5.9” in *Linux Fast-STREAMS Porting Guide*.

— SUPER-UX

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *SUPER-UX* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from SUPER-UX” in *Linux Fast-STREAMS Porting Guide*.

— *UXP/V*

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *UXP/V* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from *UXP/V*” in *Linux Fast-STREAMS Porting Guide*.

— *LiS-2.16.18*

Linux Fast-STREAMS provides compatibility functions for source level compatibility with *LiS-2.16.18* and to ease porting of modules and drivers to *Linux Fast-STREAMS*. Portability considerations are maintained in a separate manual: see section “Porting from Linux STREAMS (LiS) 2.16.18” in *Linux Fast-STREAMS Porting Guide*.

For additional details, see section “About This Manual” in *Linux Fast-STREAMS Porting Guide*.

5 Releases

This is the OpenSS7 Release of the Linux Fast-STREAMS core, tools, drivers and modules that implement the *Linux Fast-STREAMS* SVR 4.2 MP STREAMS utility for Linux. This package is intended as a replacement package for *Linux STREAMS (LiS)*.

The following sections provide information on Linux Fast-STREAMS releases as well as compatibility information of OpenSS7 release to mainstream UNIX releases of the core, modules and drivers, as well as Linux kernel compatibility.

5.1 Prerequisites

Prerequisites for the Linux Fast-STREAMS package are as follows:

- A fairly LSB compliant GNU/Linux distribution.¹
- Linux 2.4 or 2.6 kernel (2.4.10 - 2.4.27) or (2.6.3 - 2.6.10)
- glibc2 or better.
- GNU info (for info files).
- GNU groff (for man pages).²

5.2 Compatibility

This section discusses compatibility with major prerequisites.

5.2.1 GNU/Linux Distributions

Linux Fast-STREAMS is compatible with the following *Linux* distributions:

- RedHat Linux 7.2 (RH7)
- RedHat Linux 7.3 (RH7)
- Performance Technologies *NexusWare*24
- RedHat Linux 8.0 (RH8)
- RedHat Linux 9 (RH9)
- SuSE 8.0 Professional
- Fedora Core 1 (FC1)
- Debian 3.0r2 Woody
- Mandrakelinux 9.2 (MDK92)
- RedHat Enterprise Linux 3.0 (EL3)
- WhiteBox Enterprise Linux 3.0 (WBEL3)
- CentOS Enterprise Linux 3.4 (centos34)
- Fedora Core 2 (FC2)
- SuSE 9.1 Personal
- Mandrakelinux 10.0 (MDK100)

¹ See [Section 5.2.1 \[GNU/Linux Distributions\]](#), page 13, for more information.

² If you are using a Debian release, please make sure to install the groff extension package ('`groff_ext`'), as it contains the `refer` or `grefer` commands necessary for including references in the manual pages.

- SuSE 9.2 Professional (SuSE9.2)
- Mandrakelinux 10.1 (MDK101)
- Fedora Core 3 (FC3)
- RedHat Enterprise Linux 4 (EL4)
- CentOS Enterprise Linux 4.0 (centos4)
- WhiteBox Enterprise Linux 4 (WBEL4)
- Fedora Core 4 (FC4)
- Debian 3.1r0a Sarge
- Lineox 4.026 (LEL4)
- Mandriva Linux LE2005 (MDK102)

When installing from the tarball (see [Section 6.4.3 \[Installing the Tar Ball\]](#), page 46), this distribution is probably compatible with a much broader array of distributions than those listed above. These are the distributions against which the current maintainer creates and tests builds.

5.2.2 Kernel

Linux Fast-STREAMS compiles as a *Linux* kernel module. It is not necessary to patch the *Linux* kernel to use the package. At a later date, it is possible to move this package into the kernel.

Linux Fast-STREAMS is compatible with 2.4 kernel series after 2.4.10. It has been tested up to and including 2.6.10.

5.2.3 Linux STREAMS

Linux Fast-STREAMS provides a suitable replacement for the (now deprecated) *Linux STREAMS (LiS) 2.18.0* package formerly maintained by Dave Goethe of [GCOM](#).

5.2.4 Linux Fast-STREAMS

5.3 Release Notes

The sections that follow provide information on OpenSS7 releases of the Linux Fast-STREAMS package.

5.3.1 Release streams-0.7a.3

Updated for Linux 2.6 kernels and associated mainline distributions.

5.3.2 Release streams-0.7a-2

Removed all XTI/TLI and Linux networking code, headers and documentation from streams distribution and set epoch at 0. Linux networking code has been migrated to the strxnet, strinet and strscpt packages. The purpose for doing this was to allow the Linux networking to build against *Linux Fast-STREAMS* as well as *Linux STREAMS* and is a preparation for phasing out LiS and phasing in LfS.

This was an internal alpha test release and was not released publicly.

5.3.3 Release streams-0.7a-1

This is the initial release of the Linux Fast-STREAMS package for Linux. This is intended as a high-performance, production replacement for *Linux STREAMS (LiS)*. Linux Fast-STREAMS has the following features:

- optimized for Linux kernels.
- prepared for mainstream Linux kernel adoption.
- linted and follows kernel coding practices.
- compatibility modes for AIX, HP-UX, OSF, Solaris, UnixWare, SVR 4.2 and LiS.
- supports all major SVR4.2 variants.
- licensed under GPL with commercial licensing available.
- supports full SVR 4.2 MP synchronization models.
- runs at SoftIRQ.
- provides common SVR 4.2 system tunable parameters and sysctls.
- provides /proc filesystem access for debugging and performance tuning.
- provides a full set of common STREAMS modules and drivers.
- provides full name-streams device and shadow special filesystem support.

This was an internal alpha test release and was not released publicly.

5.4 Bugs

Linux Fast-STREAMS has many known bugs. These are alpha releases. Use at your own risk. Remember that there is **NO WARRANTY**.³

This software is *alpha* software. As such, it will likely crash your kernel. Installation of the software may irreparably mangle your header files or Linux distribution in such a way as to make it unusable. Crashes will likely lock your system and rebooting the system might not repair the problem. You can lose all the data on your system. Because this software can crash your kernel, the resulting unstable system could destroy computer hardware or peripherals making them unusable. You will likely void the warranty on any system on which you run this software. YOU HAVE BEEN WARNED.

5.5 Schedule

5.6 History

³ See section **NO WARRANTY** under [Section A.1 \[GNU General Public License\]](#), page 53.

6 Installation

6.1 Downloading

The Linux Fast-STREAMS package releases can be downloaded from the downloads page of [The OpenSS7 Project](#). The package is available as a binary RPM (for popular architectures) a source RPM, Debian binary DEB and source DSC, or as a tar ball. If you are using a browsable viewer, you can obtain the OpenSS7 release of **streams** from the links in the sections that follow.

By far the easiest form for installing and using **streams-0.7a.3** is to download and install binary RPM. If a binary RPM is not available for your distribution, but your distribution supports RPM, the next best method for installing and using **streams-0.7a.3** is to download and rebuild the source RPM. If your architecture does not support RPM at all, or you have special needs (such as cross-compiling for embedded targets), the final resort method is to download, configure, build and install from the source tarball.

6.1.1 Downloading the Binary RPM

To install from binary RPM, you will need several of the RPM for a complete installation. Binary RPM fall into several categories. To download and install a complete package requires the appropriate RPM from each of the several categories below.

To install from Binary RPM, you will need all of the following kernel independent packages for your architecture, and one of the kernel-dependent packages from the next section.

Independent RPM

Independent RPM are not dependent on the Linux kernel version. For example, the source package '**streams-source-0.7a.3-1.7.x.noarch.rpm**', is not dependent on kernel.

All of the following kernel independent RPM are required for your architecture. Binary RPMs listed here are for example only: additional binary RPMs are available from the downloads site. If your architecture is not available, you can build binary RPM from the source RPM (see see [Section 6.3.1 \[Building from the Source RPM\]](#), page 41).

Architecture Independent

streams-dev-0.7a.3-1.7.x.noarch.rpm

The '**streams-dev**' package contains the device definitions necessary to run applications programs developed for Linux Fast-STREAMS.¹

streams-doc-0.7a.3-1.7.x.noarch.rpm

The '**streams-doc**' package contains this manual in plaintext, postscript, PDF and HTML forms, along with the meta-information from the '**streams**' package. It also contains all of the manual pages necessary for developing Linux Fast-STREAMS applications and Linux Fast-STREAMS STREAMS modules or drivers.

¹ Not all distributions support the '%dev' RPM macro: a case in point is the SuSE 8.0 distribution which uses an older version of **rpm**. Distributions that do not support the '%dev' macro will build devices as a '%post' operation. Note also that not all release packages contain devices. Only packages that provide STREAMS character device drivers need devices, and then only when the '**specfs**' or '**devfsd**' is not being used.

streams-init-0.7a.3-1.7.x.noarch.rpm

The ‘**streams-init**’ package contains the init scripts and provides the postinst scripts necessary to create kernel module preloads and modules definitions for all kernel module ‘**core**’ subpackages.

streams-source-0.7a.3-1.7.x.noarch.rpm

The ‘**streams-source**’ package contains the source code necessary for building the Linux Fast-STREAMS release. It includes the **autoconf** configuration utilities necessary to create and distribute tarballs, rpms and deb/dscs.

Architecture Dependent**streams-devel-0.7a.3-1.7.x.i686.rpm**

The ‘**streams-devel**’ package contains library archives for static compilation, header files to develop Linux Fast-STREAMS modules and drivers. This also includes the header files and static libraries required to compile Linux Fast-STREAMS applications programs.

streams-lib-0.7a.3-1.7.x.i686.rpm

The ‘**streams-lib**’ package contains the run-time shared libraries necessary to run application programs and utilities developed for the ‘**streams**’ package.

streams-util-0.7a.3-1.7.x.i686.rpm

The ‘**streams-util**’ package provides administrative and configuration test utilities and commands associated with the Linux Fast-STREAMS package.

Kernel-Dependent RPM

Kernel-Dependent RPM are dependent on specific Linux Kernel Binary RPM releases. Packages are provided for popular released *RedHat* kernels. Packages dependent upon *Red-Hat* or other kernel RPM will have the ‘**_kversion**’ kernel package version in the package name.

One of the following Kernel-Dependent packages is required for your architecture and kernel version. If your architecture or kernel version is not on the list, you can build binary RPM from the source RPM (see see [Section 6.3.1 \[Building from the Source RPM\]](#), page 41).²

streams-core-2.4.20-28.7bigmem-0.7a.3-1.7.x.i686.rpm

The ‘**streams-core**’ package contains the loadable kernel modules that depend only on the kernel. This package is heavily tied to the kernel for which it was compiled. This particular package applies to kernel version ‘2.4.20-28.7bigmem’.³

² Note that on *Mandrakelinux*, unlike other RPM kernel distributions, kernel packages for the ix86 architectures are always placed in i586 architecture packages regardless of the true processor architecture of the kernel package. **configure** detects this and builds the appropriate packages.

³ Note that the ‘**_kversion**’ of ‘2.4.20-28.7bigmem’ is only an example. Note also that only release packages that contain kernel modules will contain a ‘**core**’ subpackage.

streams-info-2.4.20-28.7bigmem-0.7a.3-1.7.x.i686.rpm

The ‘**streams-info**’ package⁴ contains the module symbol version information for the ‘**core**’ subpackage, above. It is possible to load this subpackage and compile modules that use the exported symbols without loading the actual kernel modules (from the ‘**core**’ subpackage above). This package is heavily tied to the kernel for which it was compiled. This particular package applies to kernel version ‘2.4.20-28.7bigmem’.⁵

Configuration and Installation

To configure, build and install the binary RPM, See [Section 6.2.1 \[Configuring the Binary RPM\]](#), page 24.

6.1.2 Downloading the Debian DEB

To install from binary DEB, you will need several of the DEB for a complete installation. Binary DEB fall into several categories. To download and install a complete package requires the appropriate DEB from each of the several categories below.

To install from Binary DEB, you will need all of the following kernel independent packages for your architecture, and one of the kernel-dependent packages from the next section.

Independent DEB

Independent DEB are not dependent on the Linux kernel version. For example, the source package ‘**streams-source_0.7a.3-0_i386.deb**’, is not dependent on kernel.

All of the following kernel independent DEB are required for your architecture. Binary DEBs listed here are for example only: additional binary DEBs are available from the downloads site. If your architecture is not available, you can build binary DEB from the Debian DSC (see see [Section 6.3.2 \[Building from the Debian DSC\]](#), page 42).

Architecture Independent

streams-dev_0.7a.3-0-all.deb

The ‘**streams-dev**’ package contains the device definitions necessary to run applications programs developed for Linux Fast-STREAMS.⁶

streams-doc_0.7a.3-0-all.deb

The ‘**streams-doc**’ package contains this manual in plaintext, postscript, PDF and HTML forms, along with the meta-information from the ‘**streams**’ package. It also contains all of the manual pages necessary for developing Linux Fast-STREAMS applications and Linux Fast-STREAMS STREAMS modules or drivers.

⁴ Note that only release packages that contain kernel modules and that export versioned symbols will contain a ‘**info**’ subpackage. Also, this subpackage is only applicable to 2.4 series kernels and is not necessary and not built for 2.6 series kernels.

⁵ Note that the ‘**_kversion**’ of ‘2.4.20-28.7bigmem’ is only an example.

⁶ Note that not all release packages contain devices. Only packages that provide STREAMS character device drivers need devices, and then only when the ‘**specfs**’ or ‘**devfsd**’ is not being used.

streams-init_0.7a.3-0_all.deb

The ‘**streams-init**’ package contains the init scripts and provides the postinst scripts necessary to create kernel module preloads and modules definitions for all kernel module ‘**core**’ subpackages.

streams-source_0.7a.3-0_all.deb

The ‘**streams-source**’ package contains the source code necessary for building the Linux Fast-STREAMS release. It includes the **autoconf** configuration utilities necessary to create and distribute tarballs, rpms and deb/dscs. `!ignore7`
`!end ignore`

Architecture Dependent**streams-devel_0.7a.3-0_i386.deb**

The ‘**streams-devel**’ package contains library archives for static compilation, header files to develop Linux Fast-STREAMS modules and drivers. This also includes the header files and static libraries required to compile Linux Fast-STREAMS applications programs.

streams-lib_0.7a.3-0_i386.deb

The ‘**streams-lib**’ package contains the run-time shared libraries necessary to run application programs and utilities developed for the ‘**streams**’ package.

Kernel-Dependent DEB

Kernel-Dependent DEB are dependent on specific Linux Kernel Binary DEB releases. Packages are provided for popular released *RedHat* kernels. Packages dependent upon *RedHat* or other kernel DEB will have the ‘**_kversion**’ kernel package version in the package name.

One of the following Kernel-Dependent packages is required for your architecture and kernel version. If your architecture or kernel version is not on the list, you can build binary DEB from the source DEB (see see [Section 6.3.2 \[Building from the Debian DSC\]](#), page 42).⁸

streams-core-2.4.20-28.7bigmem_0.7a.3-0_i386.deb

The ‘**streams-core**’ package contains the loadable kernel modules that depend only on the kernel. This package is heavily tied to the kernel for which it was compiled. This particular package applies to kernel version ‘2.4.20-28.7bigmem’.⁹

streams-info-2.4.20-28.7bigmem_0.7a.3-0_i386.deb

The ‘**streams-info**’ package¹⁰ contains the module symbol version information for the ‘**core**’ subpackage, above. It is possible to load this subpackage and

⁷ Note that not all releases have source DEB packages. Release packages that do not contain kernel modules do not generate a source DEB package.

⁸ Note that on *Mandrakelinux*, unlike other DEB kernel distributions, kernel packages for the ix86 architectures are always placed in i586 architecture packages regardless of the true processor architecture of the kernel package. **configure** detects this and builds the appropriate packages.

⁹ Note that the ‘**_kversion**’ of ‘2.4.20-28.7bigmem’ is only an example. Note also that only release packages that contain kernel modules will contain a ‘**core**’ subpackage.

¹⁰ Note that only release packages that contain kernel modules and that export versioned symbols will contain a ‘**info**’ subpackage. Also, this subpackage is only applicable to 2.4 series kernels and is not necessary and not built for 2.6 series kernels.

compile modules that use the exported symbols without loading the actual kernel modules (from the ‘core’ subpackage above). This package is heavily tied to the kernel for which it was compiled. This particular package applies to kernel version ‘2.4.20-28.7bigmem’.¹¹

Configuration and Installation

To configure, build and install the Debian DEB, See [Section 6.2.2 \[Configuring the Debian DEB\]](#), page 25.

6.1.3 Downloading the Source RPM

If you cannot obtain a binary RPM for your architecture, or would like to roll your own binary RPM, download the following source RPM.

`streams-0.7a.3-1.src.rpm`

This is the source RPM for the package. From this source RPM it is possible to build binary RPM for any supported architecture and for any 2.4 or 2.6 kernel.

Configuration

To configure the source RPM, See [Section 6.2.3 \[Configuring the Source RPM\]](#), page 25.

6.1.4 Downloading the Debian DSC

If you cannot obtain a binary DEB for your architecture, or would like to roll your own DEB, download the following Debian DSC.

`streams_0.7a.3-0.dsc`

`streams_0.7a.3-0.tar.gz`

This is the Debian DSC for the package. From this Debian DSC it is possible to build binary DEB for any supported architecture and for any 2.4 or 2.6 kernel.

Configuration

To configure the source RPM, See [Section 6.2.4 \[Configuring the Debian DSC\]](#), page 31.

6.1.5 Downloading the Tar Ball

For non-RPM architectures, such as NexusWare embedded target, download the tarball as follows:

`streams-0.7a.3.tar.gz`

`streams-0.7a.3.tar.bz2`

These are the `tar` balls for the release. These `tar` balls contain the `autoconf` distribution which includes all the source necessary for building and installing the package. These tarballs will even build Source RPM and Binary RPM on RPM architectures and Debian DSC and DEB on DPKG architectures.

The tar ball may be downloaded easily with `wget` as follows:

```
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
```

¹¹ Note that the ‘_kversion’ of ‘2.4.20-28.7bigmem’ is only an example.

or

```
% wget http://www.openss7.org/streams-0.7a.3.tar.gz
```

Unpacking the Archive

After downloading one of the tar balls, unpack the archive using one of the following commands:

```
% wget http://www.openss7.org/streams-0.7a.3.tar.gz
% tar -xzf streams-0.7a.3.tar.gz
```

or

```
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
% tar -xjvf streams-0.7a.3.tar.bz2
```

Either will create a subdirectory name ‘streams-0.7a.3’ containing all of the files and subdirectories for the streams package.

Configuration

To configure and install the tar ball, See [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31.

6.1.6 Downloading from CVS

If you are a subscriber or sponsor of [The OpenSS7 Project](#) with CVS archive access privileges then you can download release or mid-release versions of the ‘streams’ package from the project CVS archive.

The Linux Fast-STREAMS package is located in the ‘streams’ subdirectory of ‘/var/cvs’. For release tag information, see [Chapter 5 \[Releases\]](#), page 13.

To access the archive from the project CVS pserver, use the following commands to check out a version from the archive:

```
% export CVSROOT='-d:pserver:username@cvs.openss7.com:2401/var/cvs'
% cvs login
Password: *****
% cvs co -r streams_0.7a.3 streams
% cvs logout
```

It is, of course, possible to check out by date or by other criteria. For more information, see [section “cvs\(1\)” in *The Manual Pages*](#).

Preparing the CVS Working Directory

Although public releases of the ‘streams’ package do not require reconfiguration, creating a configurable directory from the CVS archive requires tools not normally distributed with the other releases.

The build host requires the following GNU tools:

- `autoconf 2.59`
- `automake 1.9.5`
- `libtool 1.5.14`
- `gettext 0.14.1`
- `texinfo 4.6`

It should be stressed that, in particular, the `autoconf` and `automake` must be at version releases 2.59 and 1.9. *The versions normally distributed in mainstream GNU/Linux distributions are, in fact, much older than these versions.*¹² GNU version of these packages configured and installed to default directories will install in `‘/usr/local/’` allowing them to coexist with distribution installed versions.

In addition, the build host requires a complete tool chain for compiling for the target host, including kernel tools such as `gensyms` and others.

To generate a configuration script and the necessary scriptlets required by the GNU `autoconf` system, execute the following commands on the working directory:

```
% autoreconf -fiv streams
```

where, `‘streams’` is the name of the directory to where the working copy was checked out under the previous step. This command generates the `configure` script and other missing pieces that are normally distributed with the release Tar Balls, SRPMs and DSCs.

Make sure that `‘autoreconf --version’` returns `‘2.59’`. Otherwise, you may need to perform something like the following:

```
% PATH="/usr/local/bin:$PATH"  
% autoreconf -fiv streams
```

After reconfiguring the directory, the package can then be configured and built using the same instructions as are used for the Tar Ball, see [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31, and [Section 6.3.3 \[Building from the Tar Ball\]](#), page 42.

Do note, however, that `make` will rebuild the documentation that is normally released with the package. Additional tools may be necessary for building the documentation.

When configuring the package in a working directory and while working a change-compile-test cycle that involves configuration macros or documentation, I find it of great advantage to invoke the GNU `configure` options `--enable-maintainer-mode` and `--enable-dependency-tracking`. The first of these two options will add maintainer-specific targets to any generated `‘Makefile’`, and the later will invoke automatic dependency tracking within the `‘Makefile’` so rebuilds after changes to macro, source or documentation files will be automatically rebuilt.

6.2 Configuration

¹² A notable exception is Debian.

6.2.1 Configuring the Binary RPM

In general the binary RPM do not require any configuration, however, during installation it is possible to relocate some of the installation directories. This allows some degree of customization. Relocations that are available on the binary RPM are as follows:

`'streams-core-2.4.20-28.7bigmem-0.7a.3-1.7.x.i686.rpm'`

`'/lib/modules/2.4.20-28.7bigmem'`

This relocatable directory contains the kernel modules that provide the streams core, drivers and modules.¹³

`'streams-info-2.4.20-28.7bigmem-0.7a.3-1.7.x.i686.rpm'`

`'/usr/include/streams/2.4.20-28.7bigmem'`

This relocatable directory contains the kernel module exported symbol information that allows other kernel modules to be compiled against the correct version of the streams package.¹⁴

`'streams-dev-0.7a.3-1.7.x.i686.rpm'`

(not relocatable)

`'streams-devel-0.7a.3-1.7.x.i686.rpm'`

`'/usr/lib'`

This relocatable directory contains streams libraries.

`'/usr/include/streams'`

This relocatable directory contains streams header files.

`'streams-doc-0.7a.3-1.7.x.i686.rpm'`

`'/usr/share/doc'`

This relocatable directory contains all package specific documentation (including this manual). The subdirectory in this directory is the `'streams-0.7a.3'` directory.

`'/usr/share/info'`

This relocatable directory contains info files (including the info version of this manual).

`'/usr/share/man'`

This relocatable directory contains manual pages.

`'streams-lib-0.7a.3-1.7.x.i686.rpm'`

`'/usr/lib'`

This relocatable directory contains the run-time shared libraries necessary to run applications programs and utilities developed for Linux Fast-STREAMS.

`'/usr/share/locale'`

This relocatable directory contains the locale information for shared library files.

¹³ Note that the `'_kversion'` of `'2.4.20-28.7bigmem'` is only an example.

¹⁴ Note that the `'_kversion'` of `'2.4.20-28.7bigmem'` is only an example. Also, note that the `'info'` subpackage is only applicable to the 2.4 kernel series.

`'streams-source-0.7a.3-1.7.x.i686.rpm'`

`'/usr/src'`

This relocatable directory contains the source code.

`'streams-util-0.7a.3-1.7.x.i686.rpm'`

`'/usr/bin'`

This relocatable directory contains binary programs and utilities.

`'/usr/sbin'`

This relocatable directory contains system binary programs and utilities.

`'/usr/libexec'`

This relocatable directory contains test programs.

`'/etc'`

This relocatable directory contains init scripts and configuration information.

Installation

To install the binary RPM, See [Section 6.4.1 \[Installing the Binary RPM\]](#), page 45.

6.2.2 Configuring the Debian DEB

In general the binary DEB do not require any configuration.

Installation

To install the Debian DEB, See [Section 6.4.2 \[Installing the Debian DEB\]](#), page 46.

6.2.3 Configuring the Source RPM

When building from the source RPM (see [Section 6.3.1 \[Building from the Source RPM\]](#), page 41), the rebuild process uses a number of macros from the user's `'rpmmacros'` file as described in [section "rpm\(8\)" in *The Manual Pages*](#).

Following is an example of the `'~/rpmmacros'` file that I use for rebuilding RPMS:

```

#
# RPM macros for building rpms
#

%_topdir /usr/src/openss7.rpms

%vendor OpenSS7 Corporation
%distribution OpenSS7
%disturl http://www.openss7.org/
%packager Brian Bidulock <bidulock@openss7.org>
%url http://www.openss7.org/

%_signature gpg
%_gpg_path /home/brian/.gnupg
%_gpg_name openss7@openss7.org
%_gpgbin /usr/bin/gpg

%_source_payload w9.bzdio
%_binary_payload w9.bzdio

%_unpackaged_files_terminate_build 1
%_missing_doc_files_terminate_build 1
%_enable_debug_packages 1

#
# Template for debug information sub-package.
# with our little addition of release
#
%debug_package \
%ifnarch noarch\
%global __debug_package 1\
%package debug\
Summary: Debug information for package %{name}\
Group: Development/Debug\
AutoReqProv: 0\
%{?fullrelease:Release: %{fullrelease}}\
%description debug\
This package provides debug information for package %{name}.\
Debug information is useful when developing applications that use this\
package or when debugging this package.\
%files debug -f debugfiles.list\
%defattr(-,root,root)\
%endif\
%{nil}

```

When building from the source RPM (see [Section 6.3.1 \[Building from the Source RPM\]](#), [page 41](#)), it is possible to pass a number of additional configuration options to the `rpmbuild` process.

The additional configuration options are described below.

Note that distributions that use older versions of `rpm` do not have the ‘`--with`’ or ‘`--without`’ options defined. To achieve the same effect as:

```
--with someparm=somearg
```

do:

```
--define "_with_someparm --with-someparm=somearg"
```

`--define "_kversion $PACKAGE_KVERSION"`

Specifies the kernel version other than the running kernel for which to build. If `_kversion` is not defined when rebuilding, the environment variable `PACKAGE_KVERSION` is used. If the environment variable `PACKAGE_KVERSION` is not defined, then the version of the running kernel (i.e. discovered with `'uname -r'`) is used as the target version for kernel-dependent packages. This option can also be defined in an `'rpmspec'` file using the macro name `'_kversion'`.

`--with checks`

`--without checks`

Enable or disable preinstall checks. Each packages supports a number of preinstall checks that can be performed by invoking the `'check'` target with `make`. These currently consist of checking each kernel module for unresolved kernel symbols, checking for documentation for exported kernel module symbols, checking for documentation for exported library symbols, checking for standard options for build and installable programs, checking for documentation for built and installable programs. Normally these checks are only run in maintainer mode, but can be enabled and disabled with this option.

`--with k-optimize=HOW`

`--without k-optimize`

Specify `'HOW'` optimization, *normal*, *size*, *speed* or *quick*. *size* compiles kernel modules `-Os`, *speed* compiles kernel modules `-O3`, and *quick* compiles kernel modules `-O0`. The default is *normal*. Use with care.

`--with cooked-manpages`

`--without cooked-manpages`

Some systems do not like `grefer` references in manpages.¹⁵ This option will cook `soelim`, `refer`, `tbl` and `pic` commands from the manpages and also strip `groff` comments. The default is to leave manpages uncooked: they are actually smaller that way.

`--with public`

`--without public`

Release public packages or private packages. This option has no effect on the `'streams'` package. The default is to release public packages.

`--with k-debug`

`--without k-debug`

Specifies whether kernel debugging is to be performed on the build kernel modules. Mutually exclusive with `test` and `safe` below. This has the effect of removing static and inline attributes from functions and invoking all debugging macros in the code. The default is to not perform kernel debugging.

¹⁵ In particular, some *Debian* systems do not load the `groff` extensions package and do not have `grefer` installed. Although this is an oversight on the configuration of the particular *Debian* system, we accomodate such misconfiguration with this feature.

`--with k-test`

`--without k-test`

Specifies whether kernel testing is to be performed. Mutually exclusive with `debug` above and `safe` below. This has the effect of removing static and inline attributes from functions and invoking most debugging macros in the code. The default is to not perform kernel testing.

`--with k-safe`

`--without k-safe`

Specifies whether kernel safety is to be performed. Mutually exclusive with `debug` and `test` above. This has the effect of invoking some more pedantic assertion macros in the code. The default is not to apply kernel safety.

`--with k-inline`

`--without k-inline`

Specifies whether kernel `inline` functions are to be place inline. This has the effect of adding the `-finline-functions` flag to `CFLAGS` for compiling kernel modules. Linux 2.4 kernels are normally compiled `-O2` which does not respect the `inline` directive. This compiles kernel modules with `-finline-functions` to get closer to `-O3` optimization. For better optimization controls, See [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31.

`--with k-modversions`

`--without k-modversions`

Specifies whether kernel symbol versioning is to be applied to symbols exported by package kernel modules. The default is to version exported module symbols. This package does not export symbols so this option has no effect.

`--with devfs`

`--without devfs`

Specifies whether the build is for a device filesystem daemon enabled system with autoloading, or not. The default is to build for `devfsd` autoloading when `CONFIG_DEVFS_FS` is defined in the target kernel. The `rebuild` target uses this option to signal to the RPM spec file that the `'dev'` subpackage need not be built. This option does not appear when the package has no devices.

`--with tools`

`--without tools`

Specifies whether user space packages are to be built. The default is to build user space packages. This option can be useful when rebuilding for multiple architectures and target kernels. The `rebuild` automake target uses this feature when rebuilding for all available architectures and kernels, to rebuild user packages once per architecture instead of once per kernel.

`--with modules`

`--without modules`

Specifies whether kernel modules packages are to be built. The default is to build kernel module packages. This option can be useful when rebuilding for multiple architectures and target kernels. The `rebuild` automake target uses this feature to rebuild for all available architectures and kernels.

In addition, the following `rpm` options, specific to the Linux Fast-STREAMS package are available:

- `--without compat-svr4`
Disable source compatibility with SVR 4.2 MP variants. This option disables the SVR 4.2 MP compatibility functions that are included in the separate kernel module `'streams-svr4compat.o'`. This option defaults to enabled.
- `--without compat-sol8`
Disable source compatibility with Solaris 8 variants. This option disables the Solaris 8 compatibility functions that are included in the separate kernel module `'streams-suncompat.o'`. This option defaults to enabled.
- `--without compat-uw7`
Disable source compatibility with UnixWare 7 variants. This option disables the UnixWare 7 compatibility functions that are included in the separate kernel module `'streams-uw7compat.o'`. This option defaults to enabled.
- `--without compat-osf`
Disable source compatibility with OSF/1.2 variants. This option disables the OSF/1.2 compatibility functions that are included in the separate kernel module `'streams-osfcompat.o'`. This option defaults to enabled.
- `--without compat-aix`
Disable source compatibility with AIX 4 variants. This option disables the AIX 4 compatibility functions that are included in the separate kernel module `'streams-aixcompat.o'`. This option defaults to enabled.
- `--without compat-hpux`
Disable source compatibility with HPUX variants. This option disables the HPUX compatibility functions that are included in the separate kernel module `'streams-hpuxcompat.o'`. This option defaults to enabled.
- `--without compat-lis`
Disable source compatibility with LiS variants. This option disables the LiS compatibility functions that are included in the separate kernel module `'streams-liscompat.o'`. This option defaults to enabled.
- `--with module-sth`
- `--without module-sth`
Enable building `'sth'` (stream head) module linked into `'streams'` object instead built as a separate loadable kernel module. The default is to create the module as a separate loadable kernel module.
- `--with module-pipemod`
- `--without module-pipemod`
Enable building `'pipemod'` module linked into `'streams'` object instead built as a separate loadable kernel module. The default is to create the module as a separate loadable kernel module.

`--with module-connld`
`--without module-connld`
 Enable building ‘connld’ module linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the module as a separate loadable kernel module.

`--with module-sc`
`--without module-sc`
 Enable building ‘sc’ module linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the module as a separate loadable kernel module.

`--with driver-clone`
`--without driver-clone`
 Enable building ‘clone’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

`--with driver-fifo`
`--without driver-fifo`
 Enable building ‘fifo’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

`--with driver-loop`
`--without driver-loop`
 Enable building ‘loop’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

`--with driver-sad`
`--without driver-sad`
 Enable building ‘sad’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

`--with driver-nsdev`
`--without driver-nsdev`
 Enable building ‘nsdev’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

`--with driver-echo`
`--without driver-echo`
 Enable building ‘echo’ driver linked into ‘streams’ object instead built as a separate loadable kernel module. The default is to create the driver as a separate loadable kernel module.

```

--with driver-nuls
--without driver-nuls
    Enable building 'nuls' driver linked into 'streams' object instead built as a
    separate loadable kernel module. The default is to create the driver as a separate
    loadable kernel module.

--with driver-pipe
--without driver-pipe
    Enable building 'pipe' driver linked into 'streams' object instead built as a
    separate loadable kernel module. The default is to create the driver as a separate
    loadable kernel module.

--with driver-log
--without driver-log
    Enable building 'log' driver linked into 'streams' object instead built as a
    separate loadable kernel module. The default is to create the driver as a separate
    loadable kernel module.

--with streams-fifos
--without streams-fifos
    Enable override of system fifos with STREAMS-based fifos. The default for
    this feature is disabled.

```

In general, the default values of these options are sufficient for most purposes and no options need be provided when rebuilding the Source RPMs.

Build

To build from the source RPM, See [Section 6.3.1 \[Building from the Source RPM\]](#), page 41.

6.2.4 Configuring the Debian DSC

The Debian DSC can be configured by passing options in the environment variable *BUILD_DEBOPTIONS*. The options placed in this variable take the same form as those passed to the `configure` script, See [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31. For an example, See [Section 6.3.2 \[Building from the Debian DSC\]](#), page 42.

Build

To build from the Debian DSC, See [Section 6.3.2 \[Building from the Debian DSC\]](#), page 42.

6.2.5 Configuring the Tar Ball

All of the normal GNU `autoconf` configuration options and environment variables apply. Additional options and environment variables are provided to tailor or customize the build and are described below.

6.2.5.1 Configure Options

Following are the additional `configure` options, their meaning and use:

```

--enable-checks
--disable-checks
    Enable or disable preinstall checks. Each packages supports a number of pre-
    install checks that can be performed by invoking the 'check' target with make.

```

These currently consist of checking each kernel module for unresolved kernel symbols, checking for documentation for exported kernel module symbols, checking for documentation for exported library symbols, checking for standard options for build and installable programs, checking for documentation for build and installable programs. Normally these checks are only run in maintainer mode, but can be enabled and disabled with this option.

--disable-compress-manpages

Compress manpages with ‘gzip -9’ or ‘bzip2 -9’ or leave them uncompressed. The default is to compress manpages with ‘gzip -9’ or ‘bzip2 -9’ if a single compressed manpage exists in the target installation directory (**--mandir**). This disables automatic compression.

--disable-public

Disable public release. Has no effect on the ‘streams’ release. No private components exist in ‘streams’ releases.

--disable-initscripts

Disables the installation of init scripts. The default is to configure and install init scripts and their associated configuration files.

--enable-tools

Specifies whether user space programs and libraries are to be built and installed. The default is to build and install user space programs and libraries. This option can be useful when rebuilding for multiple architectures and target kernels, particularly under rpm. The **rebuild** target uses this feature when rebuilding RPMs for all available architectures and kernels, to rebuild user packages once per architecture instead of once per kernel.

--enable-modules

Specifies whether kernel modules are to be built and installed. The default is to build and install kernel modules. This option can be useful when rebuilding for multiple architectures and target kernels, particularly under rpm. The **rebuild** automake target uses this feature to rebuild for all available architectures and kernels.

--enable-arch

Specifies whether architectural dependent package components are to be built and installed. This option can be useful when rebuilding for multiple architectures and target kernels, particularly under dpkg. The default is to configure, build and install architecture dependent package components.

--enable-indep

Specifies whether architecture independent package components are to be built and installed. This option can be useful when rebuilding for multiple architectures and target kernels, particularly under dpkg. The default is to configure, build and install architecture independent package components.

--enable-k-inline

Enable kernel inline functions. Most Linux kernels build without **-finline-functions**. This option adds the **-finline-functions** and **-Winline** flags to the compilation of kernel modules. Use with care.

--enable-k-safe

Enable kernel module run-time safety checks. Specifies whether kernel safety is to be performed. This option is mutually exclusive with **--enable-k-test** and **--enable-k-debug** below. This has the effect of invoking some more pedantic assertion macros in the code. The default is not to apply kernel safety.

--enable-k-test

Enable kernel module run-time testing. Specifies whether kernel testing is to be performed. This option is mutually exclusive with **--enable-k-safe** above and **--enable-k-debug** below. This has the effect of removing **static** and **inline** attributes from functions and invoking most non-performance affecting debugging macros in the code. The default is not to perform kernel testing.

--enable-k-debug

Enable kernel module run-time debugging. Specifies whether kernel debugging is to be performed. This option is mutually exclusive with **--enable-k-safe** and **--enable-k-test** above. This has the effect of removing **static** and **inline** attributes from functions and invoking all debugging macros in the code (including performance-affecting debug macros). The default is to not perform kernel debugging.

--enable-devfs**--disable-devfs**

Specifies whether the build is for a device filesystem daemon enabled system with autoloading, or not. The default is to build for devfsd autoloading when `CONFIG_DEVFS_FS` is defined in the target kernel. The **rebuild** target uses this option to signal to the RPM spec file that the **'dev'** subpackage need not be built. This option does not appear when the package has no devices.

--with-gpg-user=GNUPGUSER

Specify the **gpg** **'GNUPGUSER'** for signing RPMs and tarballs. The default is the content of the environment variable **GNUPGUSER**. If unspecified, the **gpg** program will normally use the user name of the account invoking the **gpg** program. For building source RPMs, the RPM macro **'_gpg_name'** will override this setting.

--with-gpg-home=GNUPGHOME

Specify the **'GNUPGHOME'** directory for signing RPMs and tarballs. The default is the user's **'~/.gpg'** directory. For building source RPMs, the RPM macro **'_gpg_path'** will override this setting.

--with-pkg-epoch=EPOCH

Specifies the epoch for the package. This is neither used for RPM nor Debian packages, it applies to the tarball release as a whole. The default is the contents of the **'_pkgepoch'** file in the source directory or, if that file does not exist, zero (0).

--with-pkg-release=RELEASE

Specifies the release for the package. This is neither used for RPM nor Debian packages, it applies to the tarball release as a whole. The default is the contents

of the `.pkgrelease` file in the source directory or, if that file does not exist, one (1). This is the number after the last point in the package version number.

`--with-pkg-distdir=DIR`

Specifies the distribution directory for the package. This is used by the maintainer for building distributions of tarballs. This is the directory into which archives are copied for distribution. The default is the top build directory.

`--with-cooked-manpages`

Convert manual pages to remove macro dependencies and `grefer` references. Some systems do not like `grefer` references in manpages.¹⁶ This option will cook `soelim`, `refer`, `tbl` and `pic` commands from the manpages and also strip `groff` comments. The default is to leave manpages uncooked (they are actually smaller that way).

`--with-rpm-epoch=PACKAGE_EPOCH`

Specify the `'PACKAGE_EPOCH'` for the RPM spec file. The default is to use the RPM epoch contained in the file `'.rpmepoch'`.

`--with-rpm-release=PACKAGE_RPMRELEASE`

Specify the `'PACKAGE_RPMRELEASE'` for the RPM spec file. The default is to use the RPM release contained in the file `'.rpmrelease'`.

`--with-rpm-extra=PACKAGE_RPMEXTRA`

Specify the `'PACKAGE_RPMEXTRA'` extra release information for the RPM spec file. The default is to use the RPM extra release information contained in the file `'.rpmextra'`. Otherwise, this value will be determined from automatic detection of the RPM distribution.

`--with-rpm-topdir=PACKAGE_RPMTOPDIR`

Specify the `'PACKAGE_RPMTOPDIR'` top directory for RPMs. If specified with a null `'PACKAGE_RPMTOPDIR'`, the default directory for the RPM distribution will be used. If this option is not provided on the command line, the top build directory will be used as the RPM top directory as well.

`--with-deb-epoch=EPOCH`

Specify the `'PACKAGE_DEBEPOCH'` for the DEB control file. The default is to use the DEB epoch contained in the file `'.debepoch'`.

`--with-deb-release=RELEASE`

Specify the `'PACKAGE_DEBRELEASE'` for the DEB control file. The default is to use the DEB release contained in the file `'.debrelease'`.

`--with-deb-topdir=DIR`

Specify the `'PACKAGE_DEBTOPDIR'` top directory for DEBs. If specified with a null `'PACKAGE_DEBTOPDIR'`, the default directory for the DEB distribution will be used. If this option is not provided on the command line, the top build directory will be used as the DEB top directory as well.

¹⁶ In particular, some *Debian* systems do not load the `groff` extensions package and do not have `grefer` installed. Although this is an oversight on the configuration of the particular *Debian* system, we accommodate such misconfiguration with this feature.

--with-k-release=PACKAGE_KRELEASE

Specify the 'PACKAGE_KRELEASE' release of the Linux kernel for which the build is targeted. When not cross compiling, if this option is not set, the build will be targeted at the kernel running in the build environment (e.g., 'uname -r'). When cross-compiling this option must be specified or the configure script will generate an error and terminate.

--with-k-linkage=PACKAGE_KLINKAGE

Specify the 'PACKAGE_KLINKAGE' for kernel module linkage. This can be one of the following:

- 'loadable' – loadable kernel modules
- 'linkable' – linkable kernel objects

The default is to build loadable kernel modules.

--with-k-modules=K-MODULES-DIR

Specify the 'K-MODULES-DIR' directory to which kernel modules will be installed. The default is based on the option **--with-k-release**, **--with-k-prefix** and **--with-k-rootdir**. The default is 'DESTDIR'/'K-MODULES-DIR' which is typically 'DESTDIR/lib/modules/PACKAGE_KRELEASE/'. This directory is normally located by the **configure** script and need only be provided for special cross-build environments or when requested by a **configure** script error message.

--with-k-build=K-BUILD-DIR

Specify the 'K-BUILD-DIR' base kernel build directory in which configured kernel source resides. The default is 'DESTDIR/K-MODULES-DIR/build'. This directory is normally located by the **configure** script and need only be provided for special cross-build environments or when requested by a **configure** script error message.

--with-k-source=K-SOURCE-DIR

Specify the 'K-SOURCE-DIR' base kernel build directory in which configured kernel source resides. The default is 'DESTDIR/K-MODULES-DIR/source'. This directory is normally located by the **configure** script and need only be provided for special cross-build environments or when requested by a **configure** script error message.

--with-k-modver=K-MODVER-FILE

Specify the 'K-MODVER-FILE' kernel module versions file. The default is 'K-BUILD-DIR/Module.symvers'. This file is normally located by the **configure** script and need only be provided for special cross-build environments or when requested by a **configure** script error message.

--with-k-sysmap=K-SYSMAP-FILE

Specify the 'K-SYSMAP-FILE' kernel system map file. The default is 'K-BUILD-DIR/System.map'. This file is normally located by the **configure** script and need only be provided for special cross-build environments or when requested by a **configure** script error message.

--with-k-archdir=K-ARCHDIR

Specify the 'K-ARCHDIR' kernel source architecture specific directory. The default is 'DESTDIR/K-SOURCE-DIR/arch'. This directory is normally located by

the `configure` script and need only be provided for special cross-build environments or when requested by a `configure` script error message.

`--with-k-machdir=K-MACHDIR`

Specify the 'K-MACHDIR' kernel source machine specific directory. The default is '`DESTDIR/K-SOURCE-DIR/target_cpu`'. This directory is normally located by the `configure` script and need only be provided for special cross-build environments or when requested by a `configure` script error message.

`--with-k-config=K-CONFIG`

Specify the 'K-CONFIG' kernel configuration file. The default is '`BOOT/config-K-RELEASE`'. This configuration file is normally located by the `configure` script and need only be provided for special cross-build environments or when requested by a `configure` script error message.

`--with-k-optimize=HOW`

`--without-k-optimize`

Specify 'HOW' optimization, *normal*, *size*, *speed* or *quick*. *size* compiles kernel modules `-Os`, *speed* compiles kernel modules `-O3`, and *quick* compiles kernel modules `-O0`. The default is *normal*. Use with care.

`--with-strconf-master=STRCONF_CONFIG`

Specify the 'STRCONF_CONFIG' file name to which the configuration master file is written. The default is '`Config.master`'.

`--with-base-major=STRCONF_MAJBASE`

Start numbering for major devices at 'STRCONF_MAJBASE'. The default is '230'.

In addition, the following `configure` options, specific to the Linux Fast-STREAMS package are available:

`--enable-module-sth`

Enable 'sth' (stream head) module linked into '`streams`' object. The default is to create the module as a separate loadable kernel module.

`--enable-module-pipemod`

Enable 'pipemod' module linked into '`streams`' object. The default is to create the module as a separate loadable kernel module.

`--enable-module-connld`

Enable 'connld' module linked into '`streams`' object. The default is to create the module as a separate loadable kernel module.

`--enable-module-sc`

Enable 'sc' module linked into '`streams`' object. The default is to create the module as a separate loadable kernel module.

`--enable-driver-clone`

Enable 'clone' driver linked into '`streams`' object. The default is to create the driver as a separate loadable kernel module.

`--enable-driver-fifo`

Enable 'fifo' driver linked into '`streams`' object. The default is to create the driver as a separate loadable kernel module.

- enable-driver-loop**
Enable 'loop' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-sad**
Enable 'sad' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-nsdev**
Enable 'nsdev' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-echo**
Enable 'echo' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-nuls**
Enable 'nuls' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-pipe**
Enable 'pipe' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- enable-driver-log**
Enable 'log' driver linked into 'streams' object. The default is to create the driver as a separate loadable kernel module.
- disable-compat-svr4**
Disable source compatibility with SVR 4.2 MP variants. This option disables the SVR 4.2 MP compatibility functions that are included in the separate kernel module 'streams-svr4compat.o'. The default for this feature is enabled.
- disable-compat-sol8**
Disable source compatibility with Solaris 8 variants. This option disables the Solaris 8 compatibility functions that are included in the separate kernel module 'streams-suncompat.o'. The default for this feature is enabled.
- disable-compat-uw7**
Disable source compatibility with UnixWare 7 variants. This option disables the UnixWare 7 compatibility functions that are included in the separate kernel module 'streams-uw7compat.o'. The default for this feature is enabled.
- disable-compat-osf**
Disable source compatibility with OSF/1.2 variants. This option disables the OSF/1.2 compatibility functions that are included in the separate kernel module 'streams-osfcompat.o'. The default for this feature is enabled.
- disable-compat-aix**
Disable source compatibility with AIX 4 variants. This option disables the AIX 4 compatibility functions that are included in the separate kernel module 'streams-aixcompat.o'. The default for this feature is enabled.

- disable-compat-hpux**
 Disable source compatibility with HPUNIX variants. This option disables the HPUNIX compatibility functions that are included in the separate kernel module 'streams-hpuxcompat.o'. The default for this feature is enabled.
- disable-compat-lis**
 Disable source compatibility with LiS variants. This option disables the LiS compatibility functions that are included in the separate kernel module 'streams-liscompat.o'. The default for this feature is enabled.
- enable-streams-fifos**
 Enable override of system fifos with STREAMS-based fifos. The default for this feature is disabled.

6.2.5.2 Environment Variables

Following are additional environment variables to **configure**, their meaning and use:

GPG GPG signature command. This is used for signing distributions by the maintainer. By default, **configure** will search for this tool.

GNUPGUSER
 GPG user name. This is used for signing distributions by the maintainer.

GNUPGHOME
 GPG home directory. This is used for signing distributions by the maintainer.

GPGPASSWD
 GPG password for signing. This is used for signing distributions by the maintainer. This environment variable is not maintained by the **configure** script and should only be used on an isolated system.

SOELIM Roff source elimination command. This is only necessary when the option **--with-cooked-manpages** has been specified and **configure** cannot find the proper **soelim** command. By default, **configure** will search for this tool.

REFER Roff references command. This is only necessary when the option **--with-cooked-manpages** has been specified and **configure** cannot find the proper **refer** command. By default, **configure** will search for this tool.

TBL Roff table command. This is only necessary when the option **--with-cooked-manpages** has been specified and **configure** cannot find the proper **tbl** command. By default, **configure** will search for this tool.

PIC Roff picture command. This is only necessary when the option **--with-cooked-manpages** has been specified and **configure** cannot find the proper **pic** command. By default, **configure** will search for this tool.

GZIP Default compression options provided to **GZIP_CMD**.

GZIP_CMD
 Manpages (and kernel modules) compression commands. This is only necessary when the option **--without-compressed-manpages** has *not* been specified and **configure** cannot find the proper **gzip** command. By default, **configure** will search for this tool.

BZIP2 Default compression options provided to *BZIP2_CMD*

BZIP2_CMD

Manpages compression commands. This is only necessary when the option `--without-compressed-manpages` has *not* been specified and `configure` cannot find the proper `bzip2` command. By default, `configure` will search for this tool.

MAKEWHATIS

Manpages apropros database rebuild command. By default, `configure` will search for this tool. By default, `configure` will search for this tool.

CHKCONFIG

Chkconfig command. This was used for installation of init scripts. All packages now come with `init_install` and `init_remove` scripts used to install and remove init scripts on both RPM and debian systems.

RPM Rpm command. This is only necessary for RPM builds. By default, `configure` will search for this tool.

RPMBUILD

Build RPM command. This is only necessary for RPM builds. By default, `configure` will search for this tool. `rpm` will be used instead of `rpmbuild` only if `rpmbuild` cannot be found.

DPKG Dpkg comand. This command is used for building debian packages. By default, `configure` will search for this tool.

DPKG_SOURCE

Dpkg-source command. This command is used for building debian dsc packages. By default, `configure` will search for this tool.

DPKG_BUILDPACKAGE

Dpkg-buildpackage command. This command is used for building debian deb packages. By default, `configure` will search for this tool.

DEB_BUILD_ARCH

Debian build architecture. This variable is used for building debian packages. The default is the autoconf build architectre.

DEB_BUILD_GNU_CPU

Debian build cpu. This variable is used for building debian packages. The default is the autoconf build cpu.

DEB_BUILD_GNU_SYSTEM

Debian build os. This variable is used for building debian packages. The default is the autoconf build os.

DEB_BUILD_GNU_TYPE

Debian build alias. This variable is used for building debian packages. The default is the autoconf build alias.

DEB_HOST_ARCH

Debian host architecture. This variable is used for building debian packages. The default is the autoconf host architecture.

DEB_HOST_GNU_CPU

Debian host cpu. This variable is used for building debian packages. The default is the autoconf host cpu.

DEB_HOST_GNU_SYSTEM

Debian host os. This variable is used for building debian packages. The default is the autoconf host os.

DEB_HOST_GNU_TYPE

Debian host alias. This variable is used for building debian packages. The default is the autoconf host alias.

LDCONFIG

Configure loader command. Command used to configure the loader when libraries are installed. By default, **configure** will search for this tool.

DESTDIR Cross build root directory. Specifies the root directory for build and installation. For example, for NexusWare cross-builds, this is set to environment variable *NEXUSWARE_PREFIX* on configuration to point to the root of the cross-build tree for both configuration and installation.

DEPMOD

Build kernel module dependencies command. This is used during installation of kernel modules to a running kernel to rebuild the modules dependency database. By default, **configure** will search for this tool.

MODPROBE

Probe kernel module dependencies command. This is used during installation of kernel modules to a running kernel to remove old modules. By default, **configure** will search for this tool.

LSMOD

List kernel modules command. This is used during installation of kernel modules to a running kernel to detect old modules for removal. By default, **configure** will search for this tool.

LSOF

List open files command. This is used during installation of kernel modules to a running kernel to detect old modules for removal. Processes owning the old kernel modules will be killed and the module removed. If the process restarts, the new module will be demand loaded. By default, **configure** will search for this tool.

GENKSYMS

Generate kernel symbols command. This is used for generating module symbol versions during build. By default, **configure** will search for this tool.

KGENKSYMS

Linux 2.6 generate kernel symbols command. This is used for generating module symbol version during build. By default, **configure** will search for this tool.

OBJDUMP

Object dumping command. This is used for listing information about object files. By default, **configure** will search for this tool.

NM Object symbol listing command. This is used for listing information about object files. By default, **configure** will search for this tool.

MODPOST_CACHE

Cache file for modpost. The version of the **modpost.sh** script that ships with each package can cache information to a cache file to speed multiple builds. This environment variable is used to specify a cache file.

AUTOM4TE

Autom4te command. This is the executable used by autotest for pre- and post-installation checks. By default, **configure** will search for this tool.

AUTOTEST

Autotest macro build command. This is the executable used by autotest for pre- and post-installation checks. By default, **configure** will search for this tool.

6.2.5.3 Build

To build from the tar ball, See [Section 6.3.3 \[Building from the Tar Ball\]](#), page 42.

6.3 Building

6.3.1 Building from the Source RPM

If you have downloaded the necessary source RPM (see [Section 6.1.3 \[Downloading the Source RPM\]](#), page 21), then the following instructions will rebuild the binary RPMs on your system. Once the binary RPMs are rebuilt, you may install them as described above (see [Section 6.4.1 \[Installing the Binary RPM\]](#), page 45).

The source RPM is rebuilt to binary RPMs as follows:

```
% wget http://www.openss7.org/rpms/SRPMs/streams-0.7a.3-1.src.rpm
% rpmbuild --rebuild -vv streams-0.7a.3-1.src.rpm
```

The rebuild process can also recognize a number of options that can be used to tweak the resulting binaries, See [Section 6.2.3 \[Configuring the Source RPM\]](#), page 25. These options are provided on the **rpm** command line. For example:

```
% rpmbuild --rebuild -vv --target athlon-redhat-linux \
--define "_kversion 2.4.20-28.7bigmem" \
-- streams-0.7a.3-1.src.rpm
```

will rebuild binary RPM for the ‘2.4.20-28.7bigmem’ kernel for the ‘athlon’ architecture.¹⁷

Installation

To install the resulting binary RPM, See [Section 6.4.1 \[Installing the Binary RPM\]](#), page 45.

¹⁷ Note that the ‘_kversion’ of ‘2.4.20-28.7bigmem’ is only an example.

6.3.2 Building from the Debian DSC

If you have downloaded the necessary Debian DSC (see [Section 6.1.4 \[Downloading the Debian DSC\]](#), page 21), then the following instructions will rebuild the binary DEBs on your system. Once the binary DEBs are rebuilt, you may install them as described above (see [Section 6.4.2 \[Installing the Debian DEB\]](#), page 46).

The Debian DSC is rebuilt to binary DEBs as follows:

```
% wget http://www.openss7.org/debian/streams_0.7a.3-0.dsc
% wget http://www.openss7.org/debian/streams_0.7a.3-0.tar.gz
% dpkg-buildpackage -v streams_0.7a.3-0.dsc
```

The rebuild process can also recognize a number of options that can be used to tweak the resulting binaries, See [Section 6.2.4 \[Configuring the Debian DSC\]](#), page 31. These options are provided in the environment variable *BUILD_DPKG_OPTIONS* and have the same form as the options to *configure*, See [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31. For example:

```
% BUILD_DEBOPTIONS='
    --with-k-release=2.4.20-28.7bigmem
    --host=athlon-debian-linux-gnu'
dpkg-buildpackage -v \
streams_0.7a.3-0.dsc
```

will rebuild binary DEB for the ‘2.4.20-28.7bigmem’ kernel for the ‘athlon’ architecture.¹⁸

Installation

To install the resulting binary DEB, See [Section 6.4.2 \[Installing the Debian DEB\]](#), page 46.

6.3.3 Building from the Tar Ball

If you have downloaded the tar ball (see [Section 6.1.5 \[Downloading the Tar Ball\]](#), page 21), then the following instructions will rebuild the package on your system. (Note that the build process does not required root privilege.)

6.3.3.1 Native Build

Folowing is an example of a native build against the running kernel:

```
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
% tar -xjvf streams-0.7a.3.tar.bz2
% pushd streams-0.7a.3
% ./configure
% make
% popd
```

¹⁸ Note that the ‘_kversion’ of ‘2.4.20-28.7bigmem’ is only an example.

6.3.3.2 Cross-Build

Following is an example for a cross-build. The kernel release version must always be specified for a cross-build.¹⁹ If you are cross-building, specify the root for the build with environment variable *DESTDIR*. The cross-compile host must also be specified if different from the build host. Either the compiler and other tools must be in the usual places where GNU *autoconf* can find them, or they must be specified with declarations such as ‘*CC=/u5/NexusWare24/ppc-linux/gcc*’ on the *configure* command line. Look in the file ‘*configure.nexusware*’ in the release package for an example.

```
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
% tar -xjvf streams-0.7a.3.tar.bz2
% pushd streams-0.7a.3
% ./configure DESTDIR="/some/other/root" \
--with-k-release=2.4.18 --host sparc-linux
% make
% popd
```

6.3.3.3 NexusWare Build

Additional support is provided for cross-building for the *Performance Technologies Inc. NexusWare* embedded target for the CPC-384, CPC-388 and CPC-396 cards. A configuration script wrapper (‘*configure.nexusware*’) is provided to simplify the cross-build operation for these targets. The following steps describe the process:

1. Follow the normal NexusWare instructions for rebuilding a ‘*generic*’ kernel and flash image as follows: (Note that I keep my NexusWare build in ‘*/u5/NexusWare24*’.)

```
% pushd /u5/NexusWare24
% source SETUP.sh
% make
% popd
```

2. Next download, unpack (see [Section 6.1.5 \[Downloading the Tar Ball\]](#), page 21) and configure (see [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31) using the provided ‘*configure.nexusware*’ wrapper for *configure*. This wrapper simply tells the *configure* script where to find the NexusWare sources and which NexusWare cross-building tools to use for a cross-compile.²⁰

Any of the normal *configure* script options (see [Section 6.2.5 \[Configuring the Tar Ball\]](#), page 31) can be used on the same line as ‘*./configure.nexusware*’. One of particular interest to embedded targets is ‘*--with-k-optimize=size*’ to attempt to reduce the size of the kernel modules.

¹⁹ Because it *is* a cross-build, the kernel version on the build machine is unlikely to be the kernel version of the target machine, except by coincidence.

²⁰ Although I have not tried it, because we use GNU *autoconf* for configuration, these instructions should work equally well for the Solaris NexusWare cross-building environment as it does for the Linux NexusWare cross-building environment.

3. Install as normal (see [Section 6.4.3 \[Installing the Tar Ball\]](#), page 46), however, for embedded targets the `install-strip` target should be used instead of the `install` target. The `install-strip` target will strip unnecessary symbols from kernel modules and further reduce the size in the root file system flash image.

Following is what I use for configuration and installation: (My NexusWare tree is rooted at `/u5/NexusWare`.)

```
% pushd /u5/NexusWare24
% source SETUP.sh
% make
% popd
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
% tar -xjvf streams-0.7a.3.tar.bz2
% pushd streams-0.7a.3
% ./configure.nexusware --with-k-optimize=size
% make
% make install-strip
% popd
```

Once built and installed in the NexusWare directory, you will have to (currently) hand edit a `.spec` file to include the components you want in the NexusWare root file system. If you are cross-building for NexusWare you should already know what that means. Objects that you might be interested in copying to the root file system are kernel modules that were installed in `$NEXUSWARE_PREFIX/lib/modules/2.4.18/streams`, libraries installed in `$NEXUSWARE_PREFIX/usr/lib` and utility functions installed in `$NEXUSWARE_PREFIX/usr/bin` and `$NEXUSWARE_PREFIX/usr/sbin` and test programs in `$NEXUSWARE_PREFIX/usr/libexec`. If you would prefer that these programs be installed in `$NEXUSWARE_PREFIX/lib`, `$NEXUSWARE_PREFIX/bin`, `$NEXUSWARE_PREFIX/sbin` and `$NEXUSWARE_PREFIX/libexec`, (say because you want to remote mount the `/usr` directory after boot), then specify the `--exec-prefix=/` option to `./configure.nexusware`.

In addition, because NexusWare does not include an `/etc/modules.conf` file by default, it will be necessary to add one or edit your `rc.4` file to insmod the necessary `streams` modules at boot time.

Once you have completed the necessary `.spec` and `rc.4` file entries, you need to rebuild the `generic` kernel flash image once more for these objects to be included in the flash file system. It is important that this second build of the kernel image be the same as the first.

When modifying and rebuilding a NexusWare kernel, it will be necessary to rebuild and install `streams`. Simply perform the last `make install-strip` stage or start again with `./configure.nexusware`. You can place the unpacked tarball in `$NEXUSWARE_PREFIX/usr/src/streams`, and add the following to the top-level NexusWare `Makefile` to make the build process a single step process instead of dual pass:

```
all:
...
    (cd kernels/generic; $(MAKE) depend)
    (cd usr/src/pcmcia-cs-3.2.1; $(MAKE) config)
    (cd kernels/generic; $(MAKE))
    (cd usr/src/pcmcia-cs-3.2.1; $(MAKE) pti)
    (cd usr/src/pti; $(MAKE))
    (cd drivers; $(MAKE))
    (cd utility; $(MAKE))
#    uncomment for streams build
#    (cd usr/src/streams; ./configure.nexusware; $(MAKE) install-strip)
    (cd build/generic; $(MAKE))
...
```

Another, perhaps simpler approach, is to make the necessary edits to the NexusWare top-level ‘Makefile’ and ‘.spec’ and ‘rc.4’ files, download and unpack the tar ball into the NexusWare directory, and build the NexusWare flash image as normal:

```
% wget http://www.openss7.org/streams-0.7a.3.tar.bz2
% pushd /u5/NexusWare24
% source SETUP.sh
% pushd usr/src
% tar -xjvf ${DIRSTACK[2]}/streams-0.7a.3.tar.bz2
% ln -sf streams-0.7a.3 streams
% popd
% make
% popd
```

6.4 Installing

6.4.1 Installing the Binary RPM

If you have downloaded the necessary binary RPMs (see [Section 6.1.1 \[Downloading the Binary RPM\]](#), page 17), or have rebuilt binary RPMs using the source RPM (see [Section 6.3.1 \[Building from the Source RPM\]](#), page 41), then the following instructions will install the RPMs on your system. For additional information on `rpm`, see [section “rpm\(8\)” in *The Manual Pages*](#).

```
% pushd RPMS/i686
% rpm -ihv streams-*-0.7a.3-1.7.x.i686.rpm
```

You must have the correct binary RPMs downloaded or built for this to be successful.

Some of the packages are relocatable and can have final installation directories altered with the ‘--relocate’ option to `rpm`, see [section “rpm\(8\)” in **manpages**](#). For example, the following will relocate the documentation and info directories:

```
% pushd RPMS/i686
% rpm -ihv \
    --relocate '/usr/share/doc=/usr/local/share/doc' \
    --relocate '/usr/share/info=/usr/local/share/info' \
    -- streams-doc-0.7a.3-1.7.x.i686.rpm
```

The previous example will install the ‘streams-doc’ package by will relocate the documentation an info directory contents to the ‘/usr/local’ version.

6.4.2 Installing the Debian DEB

If you have downloaded the necessary Debian DEBs (see [Section 6.1.2 \[Downloading the Debian DEB\]](#), page 19), or have rebuild binary DEBs using the Debian DSC (see [Section 6.3.2 \[Building from the Debian DSC\]](#), page 42), then the following instructions will install the DEBs on your system. For additional information on `dpkg`, see [section “dpkg\(8\)”](#) in *The Manual Pages*.

```
% pushd debian
% dpkg -iv streams-*_0.7a.3-0_*.deb
```

You must have the correct ‘.deb’ files downloaded or build for this to be successful.

6.4.3 Installing the Tar Ball

After the build process (see [Section 6.3.3 \[Building from the Tar Ball\]](#), page 42), installation only requires execution of one of two `make` targets:

‘make install’

The ‘install’ `make` target will install all the components of the package. Root privilege is required to successfully invoke this target.

‘make install-strip’

The ‘install-strip’ `make` target will install all the components of the package, but will strip unnecessary information out of the objects and compress manual pages. Root privilege is required to successfully invoke this target.

6.5 Removing

6.5.1 Removing the Binary RPM

To remove an installed version of the binary RPMs (whether obtained from the OpenSS7 binary RPM releases, or whether created by the source RPM), execute the following command:

```
% rpm -evv $(rpm -qa | grep '^streams-')
```

For more information on `rpm`, see [section “rpm\(8\)”](#) in *The Manual Pages*.

6.5.2 Removing the Debian DEB

To remove an installed version of the debian DEB (whether obtained from the OpenSSH binary DEB releases, or whether created by the Debian DSC), execute the following command:

```
% dpkg -ev `dpkg -l | grep '^streams-`
```

For more information on `dpkg`, see [section “dpkg\(8\)” in *The Manual Pages*](#).

6.5.3 Removing the Source RPM

To remove all the installed binary RPM build from the source RPM, see [Section 6.5.1 \[Removing the Binary RPM\], page 46](#). Then simply remove the binary RPM package files and source RPM file. A command such as:

```
% find / -name 'streams-*.rpm' -type f -print0 | xargs --null rm -f
```

should remove all ‘streams’ RPMs from your system.

6.5.4 Removing the Debian DSC

To remove all the installed binary DEB build from the Debian DSC, see [Section 6.5.2 \[Removing the Debian DEB\], page 46](#). Then simply remove the binary DEB package files and Debian DSC file. A command such as:

```
% find / \( -name 'streams-*.deb' \  
-o -name 'streams-*.dsc' \  
-o -name 'streams-*.tar.*' \  
\) -type f -print0 | xargs --null rm -f
```

should remove all ‘streams’ DEBs, DSCs and TARs from your system.

6.5.5 Removing the Tar Ball

To remove a version installed from tar ball, change to the build directory where the package was built and use the ‘uninstall’ make target as follows:

```
% cd /usr/src/streams  
% make uninstall  
% cd ..  
% rm -fr streams-0.7a.3  
% rm -f streams-0.7a.3.tar.gz  
% rm -f streams-0.7a.3.tar.bz2
```

If you have inadvertently removed the build directory and, therefore, no longer have a configured directory from which to execute ‘make uninstall’, then perform all of the steps for configuration and installation (see [Section 6.4.3 \[Installing the Tar Ball\], page 46](#)) except the final installation and then perform the steps above.

6.6 Loading

6.6.1 Normal Module Loading

When ‘streams’ installs, modules and drivers are normally configured for demand loading. The ‘install’ and ‘install-strip’ make targets will make the necessary changes to the ‘/etc/modules.conf’ file and place the modules in an appropriate place in ‘/lib/modules/2.4.20-28.7bigmem/streams’. The ‘make install’ process should have copied the kernel module files ‘streams-*.o’ to the directory ‘/lib/modules/2.4.20-28.7bigmem/streams’. This means that to load any of these modules, you can simply execute, for example, ‘modprobe stream-somedriver’.²¹

6.6.1.1 Linux STREAMS Module Loading

The ‘streams’ demand load system supports both the old kerneld and the new kmod mechanisms for demand loading kernel modules.

The convention for ‘streams’ kernel loadable object files is:

- Their name start with "streams-".
- They are placed in ‘/lib/modules/2.4.20-28.7bigmem/streams/’, where ‘2.4.20-28.7bigmem’ is an example kernel version.

If your kernel has been built using the ‘kerneld’ daemon, then ‘streams’ kernel modules will automatically load as soon as the STREAMS module is pushed or the driver is opened. The ‘make install’ process makes the necessary changes to the ‘/etc/modules.conf’ file. After the install, you will see lines like the following added to your ‘/etc/modules.conf’ file:

```
prune modules.streams
if -f /lib/modules/`uname -r`/modules.streams
include /lib/modules/`uname -r`/modules.streams
endif
```

which will provide for demand loading of the modules if they have been built and installed for the running kernel. The ‘/lib/modules/`uname -r`/modules.streams’ file looks like this:

```
alias char-major-245 streams-some_driver
alias char-major-246 streams-other_driver
```

Note that STREAMS modules are not listed in this file, but will be loaded by name using ‘kerneld’ if available.

6.6.1.2 Linux Fast-STREAMS Module Loading

Linux Fast-STREAMS has a wider range of kernel module loading mechanisms than is provided by *LiS*. For mechanisms used for kernel module loading under *Linux Fast-STREAMS*, See [section “Top” in *Linux Fast-STREAMS Reference Manual*](#).

²¹ Note that the ‘_kversion’ of ‘2.4.20-28.7bigmem’ is only an example.

6.6.2 NexusWare Module Loading

Under exceptional circumstances, such as a *NexusWare* build, it is necessary to hand-edit a `.spec` and `rc.4` file to load the modules at boot time.²²

²² At some time I expect to create an `install-nexusware` target that will make the necessary modifications to the `.spec` and `rc.4` files automatically.

7 Troubleshooting

7.1 Test Suites

7.2 Running Test Suites

7.3 Problem Reports

7.4 Known Bugs

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