OpenSS7 ISO Stack
Installation and Reference Manual

Version 0.9.2 Edition 1
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Package striso-0.9.2.1

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Preface

Notice

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Abstract

This manual provides a *Installation and Reference Manual* for *OpenSS7 ISO Stack*.

Objective

The objective of this manual is to provide a guide for the *STREAMS* programmer when developing *STREAMS* modules, drivers and application programs for *OpenSS7 ISO Stack*.

This guide provides information to developers on the use of the *STREAMS* mechanism at user and kernel levels.

STREAMS was incorporated in UNIX System V Release 3 to augment the character input/output (I/O) mechanism and to support development of communication services.

STREAMS provides developers with integral functions, a set of utility routines, and facilities that expedite software design and implementation.

Intent

The intent of this manual is to act as an introductory guide to the *STREAMS* programmer. It is intended to be read alone and is not intended to replace or supplement the *OpenSS7 ISO Stack* manual pages. For a reference for writing code, the manual pages (see `STREAMS(9)`) provide a better reference to the programmer. Although this describes the features of the *OpenSS7 ISO Stack* package, OpenSS7 Corporation is under no obligation to provide any software, system or feature listed herein.

Audience

This manual is intended for a highly technical audience. The reader should already be familiar with *Linux* kernel programming, the *Linux* file system, character devices, driver input and output, interrupts, software interrupt handling, scheduling, process contexts, multiprocessor locks, etc.

The guide is intended for network and systems programmers, who use the *STREAMS* mechanism at user and kernel levels for *Linux* and *UNIX* system communication services.

Readers of the guide are expected to possess prior knowledge of the *Linux* and *UNIX* system, programming, networking, and data communication.

[1] Formerly X/Open and UNIX International.

Revisions

Take care that you are working with a current version of this manual: you will not be notified of updates. To ensure that you are working with a current version, contact the Author, or check The OpenSS7 Project website for a current version.

A current version of this manual is normally distributed with the *OpenSS7 ISO Stack* package, `striso-0.9.2.1`.[2]

Version Control

```
striso.texi,v
Revision 0.9.2.10  2007/01/05 06:26:20  brian
- doc updates for release

Revision 0.9.2.9  2006/09/18 01:07:09  brian
- updated manuals and release texi docs

Revision 0.9.2.8  2006/08/28 10:47:08  brian
- correction

Revision 0.9.2.7  2006/08/28 10:32:56  brian
- updated references

Revision 0.9.2.6  2006/08/27 12:27:06  brian
- finalizing auto release files

Revision 0.9.2.5  2006/08/26 18:31:48  brian
- handle long urls

Revision 0.9.2.4  2006/08/26 09:18:51  brian
- better release file generation

Revision 0.9.2.3  2006/08/23 11:00:46  brian
- added preface, corrections and updates for release

Revision 0.9.2.1  2006-04-07 16:01:29 -0600  brian
- initial branch

Revision 0.9  2006-04-07 15:56:41 -0600  brian
- initial addition of striso files
```

ISO 9000 Compliance

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[2] http://www.openss7.org/tarballs/striso-0.9.2.1.tar.bz2

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Acknowledgements

As with most open source projects, this project would not have been possible without the valiant efforts and productive software of the *Free Software Foundation* and the *Linux Kernel Community*.

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- OpenSS7 Corporation

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- OpenSS7 Corporation
- Lockheed Martin Co.
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- Comverse Ltd.
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- SS8 Networks Inc
- Nortel Networks

- Verisign

Contributors

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- John Wenker
- Others

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See [Index of Authors], page 123, for a complete listing and cross-index of authors to sections of this manual.

Maintainer

The maintainer of the *OpenSS7 OpenSS7 ISO Stack* package is:

- Brian Bidulock

Please send bug reports to `bugs@openss7.org` using the '`send-pr`' script included in the package, only after reading the '`BUGS`' file in the release, or See Section 8.2 [Problem Reports], page 85.

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The OpenSS7 Project provides a website dedicated to the software packages released by the OpenSS7 Project.

Bug Reports

Please send bug reports to `bugs@openss7.org` using the '`send-pr`' script included in the *OpenSS7 ISO Stack* package, only after reading the '`BUGS`' file in the release, or See Section 8.2 [Problem Reports], page 85. You can access the OpenSS7 GNATS database directly via the web, however, the preferred method for sending new bug reports is via mail with the '`send-pr`' script.

Mailing Lists

The OpenSS7 Project provides a number of general discussion Mailing Lists for discussion concerning the *OpenSS7 OpenSS7 ISO Stack* package as well as other packages released by The OpenSS7 Project.

These are `mailman` mailing lists and so have convenient web interfaces for subscribers to control their settings. See http://www.openss7.org/mailinglist.html.

The mailing lists are as follows:

'openss7'
: The '`openss7`' mailing list is for general enquiries, information exchange and announcements regarding the OpenSS7 Project. This is our original mailing list and takes the highest amount of traffic.

'openss7-announce'
: The '`openss7-announce`' mailing list is for announcements related to the OpenSS7 Project. This list will accept announcements posted by subscribers. Subscribe to this list if you are interested in announcements from the OpenSS7 Project, subscribers and sponsors, related to the OpenSS7 Project or STREAMS, SS7, SIGTRAN or SCTP in general.

'openss7-cvs'
: The '`openss7-cvs`' mailing list is for automatic CVS log reporting. You must get permission of the owner to subscribe to this list. Subscribers are not allowed to post to this list, this is merely for distributing notification of changes to the CVS repository.h

'openss7-develop'
: The '`openss7-develop`' mailing list is for email exchange related to the development projects under the OpenSS7 Project. This includes development requests, proposals, requests for comment or proposal. Subscribe to this list if you are interested in ongoing development details regarding the OpenSS7 Project.

'openss7-test'
: The '`openss7-test`' mailing list is for email exchange related to the testing of code under the OpenSS7 Project. This specifically relates to conformance testing, verification testing, interoperability testing and beta testing. Subscribe to this list if you are interested in participating in and receiving ongoing details of test activities under the OpenSS7 Project.

'openss7-bugs'
: The '`openss7-bugs`' mailing list is specifically tailored to bug tracking. The mailing list takes a feed from the OpenSS7 GNATS bug tracking system and accepts posting of responses to bug reports, tracking and resolution. Subscribe to this list if you are interested in receiving detailed *OpenSS7* release code bug tracking information. This list is not archived; for historical information on problem reports, see our GNATS databases.

'openss7-updates'
: The '`openss7-updates`' mailing list provides updates on OpenSS7 Project code releases and ongoing activities. Subscribers are not allowed to post to this list; this list is for official OpenSS7 Project announcements only. Subscribe to this list if you are interested in receiving updates concerning official releases and activities of the OpenSS7 Project.

‘openss7-streams’
: The ‘openss7-streams’ mailing list is for email exchange related to the *STREAMS* development projects under the OpenSS7 Project. This includes development requests, proposals, requests for comment or proposal. Subscribe to this list if you are interested in ongoing development details regarding the OpenSS7 Project *STREAMS* components.

‘linux-streams’
: The ‘linux-streams’ mailing list is for mail exchange related to *Linux Fast-STREAMS* or *Linux STREAMS*. This includes patches, development requests, proposals, requests for comment or proposal. Subscribe to this list if you are interested in ongoing development details regarding the *STREAMS* for Linux components. This is the the new (September 2006) home of the ‘linux-streams’ list formerly of gsyc.escet.urjc.es.

Spam

To avoid spam being sent to the members of the *OpenSS7* mailing list(s), we have blocked mail from non-subscribers. Please subscribe to the mailing list before attempting to post to them. (Attempts to post when not subscribed get bounced.)

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Quick Start Guide

OpenSS7 ISO Stack

Package striso-0.9.2.1 was released under GPLv2 2007-01-08.

OpenSS7 ISO Stack (‘`striso`’) is an *OpenSS7 Project* implementation of various Open Systems Interconnect (OSI) International Standards Organization (ISO) networking components for *Linux Fast-STREAMS*.

This release is the first separate release of the *OpenSS7 ISO Stack* package. Some of the components in this package were formerly present in the ‘`strss7`’ package. Various networking drivers are provided as well as CDI, DLPI, NPI, TPI and XTI header files for ISO/OSI operation. The package contains the necessary manual pages and other documentation for ISO/OSI components in a separate autoconf tarball.

The package uses the following standard *Open Systems Interconnect (OSI)* conforming header files from the ‘`strxns`’ package:

- ‘`<sys/cdi.h>`’ *Communications Device Interface*
- ‘`<sys/dlpi.h>`’ *Data Link Provider Interface Version 2.0.0*
- ‘`<sys/npi.h>`’ *Network Provider Interface Version 2.0.0*

The package uses the following standard *Open Systems Interconnect (OSI)* conforming header files from the ‘`strxnet`’ package:

- ‘`<sys/tihdr.h>`’ *Transport Provider Interface Version 2.0.0*

The package currently includes the following *STREAMS* kernel modules and drivers:

- ‘`streams_x223.ko`’ ‘`/dev/cons`’
- ‘`streams_x233.ko`’ ‘`/dev/clns`’
- ‘`streams_x224.ko`’ ‘`/dev/tp0`’ ‘`/dev/tp4`’
- ‘`streams_X234.ko`’ ‘`/dev/clts`’
- ‘`streams_isot.ko`’ ‘`module`’ ‘`/dev/isot`’
- ‘`streams_lpp.ko`’ ‘`module`’ ‘`/dev/lpp`’
- ‘`streams_cmot.ko`’ ‘`module`’ ‘`/dev/cmot`’
- ‘`streams_itot.ko`’ ‘`module`’
- ‘`streams_itos.ko`’ ‘`module`’

- `x223(4)` driver provides *CONS* and *CLNS* services in accordance with the *ISO/OSI Network Protocol X.223*;
- `x224(4)` driver provides *OSI Transport Protocol* services in accordance with the *ISO/OSI Transport Protocol X.224*;
- `isot(4)` driver and module provides *ISO Transport over TCP/IP* as specified in *RFC 1006/STD 35*;
- `lpp(4)` driver and module provides *ISO Transport over TCP/IP* as specified in *RFC 1085*;
- `cmot(4)` driver and modules provides *ISO Common Management Information Protocol (CMIP) over TCP/IP* as specified in *RFC 1095*;
- `itot(4)` module provides *ISO Transport over TCP* as specified in *RFC 2126*; and,
- `itos(4)` module provides *ISO Transport over SCTP*.

The *OpenSS7 ISO Stack* package includes kernel modules, *SVR 4.2 STREAMS* drivers, modules, libraries, utilities, test programs, daemons, and development environment for the development and execution of *X/Open Network Services (ISO)* protocol stack components and applications for the *SVR 4.2 STREAMS* environment.

This distribution is only currently applicable to *Linux* 2.4 and 2.6 kernels and was targeted at `ix86`, `x86_64`, `ppc` and `ppc64` architectures, but should build and install for other architectures as well.

Release

This is the `striso-0.9.2.1` package, released 2007-01-08. This '`0.9.2.1`' release, and the latest version, can be obtained from the download area of The OpenSS7 Project website using a command such as:

```
$> wget http://www.openss7.org/tarballs/striso-0.9.2.1.tar.bz2
```

The release is available as an `autoconf(1)` tarball, '`src.rpm`' or '`dsc`', or as a set of binary '`rpm`'s or '`deb`'s. See the download page for the `autoconf(1)` tarballs, '`src.rpm`'s or '`dsc`'s. See the `striso` package page for tarballs, source and binary packages.

Please see the '`NEWS`' file for release notes and history of user visible changes for the current version, and the '`ChangeLog`' file for a more detailed history of implementation changes. The '`TODO`' file lists features not yet implemented and other outstanding items.

Please see the '`INSTALL`', '`INSTALL-striso`' and '`README-make`', files (or see Chapter 7 [Installation], page 37) for installation instructions.

When working from `cvs(1)` or `git(1)`, please see the '`README-cvs`', file (or see Section 7.1.6 [Downloading from CVS], page 45). An abbreviated installation procedure that works for most applications appears below.

See '`README-alpha`' (if it exists) for alpha release information.

Prerequisites

The quickest and easiest way to ensure that all prerequisites are met is to download and install this package from within the *OpenSS7 Master Package*, `openss7-0.9.2.D`, instead of separately.

Prerequisites for the OpenSS7 ISO Stack package are as follows:

1. *Linux* distribution, somewhat *Linux Standards Base* compliant, with a 2.4 or 2.6 kernel and the appropriate tool chain for compiling out-of-tree kernel modules. Most recent *Linux* distributions are okay out of the box, but some development packages must be installed. For more information, see Section 6.2 [Compatibility], page 28.
   - A fairly LSB compliant GNU/Linux distribution.[1]

[1] See Section 6.2.1 [GNU/Linux Distributions], page 28, for more information.

- Linux 2.4 kernel (2.4.10 - 2.4.27), or
- Linux 2.6 kernel (2.6.3 - 2.6.18);
- glibc2 or better.
- GNU info (for info files).
- GNU groff (for man pages).[2]

(Note: If you acquired `striso` a part of the *OpenSS7 Master Package*, then the dependencies listed below will already have been met by unpacking the master package.)

2. *OpenSS7 Linux Fast-STREAMS*, streams-0.9.2.1.[3]
3. *OpenSS7 STREAMS Compatibility Modules*, strcompat-0.9.2.4.
4. *OpenSS7 STREAMS XNS*, strxns-0.9.2.4.
5. *OpenSS7 STREAMS XTI/TLI*, strxnet-0.9.2.9.
6. *OpenSS7 STREAM Network Services Library*, strnsl-0.9.2.1. (Optional.)
7. *OpenSS7 STREAMS Sockets*, strsock-0.9.2.1. (Optional.)
8. *OpenSS7 STREAMS INET*, strinet-0.9.2.4.
9. *OpenSS7 STREAMS SCTP*, strsctp-0.9.2.6.
10. *OpenSS7 STREAMS Channels*, striso-0.9.2.1.

When configuring and building multiple *OpenSS7 Project* release packages, place all of the source packages (unpacked tarballs) at the same directory level and all build directories at the same directory level (e.g. all source packages under '`/usr/src`').

When installing packages that install as kernel modules, it is necessary to have the correct kernel development package installed. For the following distributions, use the following commands:

```
Ubuntu:  $> apt-get install linux-headers
Debian:  $> apt-get install kernel-headers
Fedora:  $> yum install kernel-devel
```

You also need the same version of `gcc(1)` compiler with which the kernel was built. If it is not the default, add '`CC=kgcc`' on the line after '`./configure`', for example:

```
$> ../striso-0.9.2.1/configure CC='gcc-3.4'
```

Installation

The following commands will download, configure, build, check, install, validate, uninstall and remove the package:

```
$> wget http://www.openss7.org/tarballs/striso-0.9.2.1.tar.bz2
$> tar -xjvf striso-0.9.2.1.tar.bz2
$> mkdir build
```

[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.

[3] Although, at one time, this package supported *LiS*, *LiS* is now deprecated and unsupported.

```
$> pushd build
$> ../striso-0.9.2.1/configure --enable-autotest
$> make
$> make check
$> sudo make install
$> sudo make installcheck
$> sudo make uninstall
$> popd
$> sudo rm -rf build
$> rm -rf striso-0.9.2.1
$> rm -f striso-0.9.2.1.tar.bz2
```

If you have problems, try building with the logging targets instead. If the make of a logging target fails, an automatic problem report will be generated that can be mailed to The OpenSS7 Project.[4] Installation steps using the logging targets proceed as follows:

```
$> wget http://www.openss7.org/tarballs/striso-0.9.2.1.tar.bz2
$> tar -xjvf striso-0.9.2.1.tar.bz2
$> mkdir build
$> pushd build
$> ../striso-0.9.2.1/configure --enable-autotest
$> make compile.log
$> make check.log
$> sudo make install.log
$> sudo make installcheck.log
$> sudo make uninstall.log
$> popd
$> sudo rm -rf build
$> rm -rf striso-0.9.2.1
$> rm -f striso-0.9.2.1.tar.bz2
```

See '`README-make`' for additional specialized make targets.

For custom applications, see the '`INSTALL`' and '`INSTALL-striso`' files or the see Chapter 7 [Installation], page 37, as listed below. If you encounter troubles, see Chapter 8 [Troubleshooting], page 81, before issuing a bug report.

Brief Installation Instructions

The OpenSS7 ISO Stack package is available from the downloads area of The OpenSS7 Project website using a command such as:

```
$> wget http://www.openss7.org/tarballs/striso-0.9.2.1.tar.bz2
```

Unpack the tarball using a command such as:

```
$> tar -xjvf striso-0.9.2.1.tar.bz2
```

The tarball will unpack into the relative subdirectory named after the package name: striso-0.9.2.1.

The package builds using the GNU `autoconf` utilities and the '`configure`' script. To build the package, we recommend using a separate '`build`' directory as follows:

[4] Please see Section 8.2 [Problem Reports], page 85, or the file '`PROBLEMS`' in the release directory for more information on filing a proper *Problem Report*.

```
$> mkdir build
$> cd build
$> ../striso-0.9.2.1/configure
```

In general, the package configures and builds without adding any special options to the '`configure`' script. For general options to the '`configure`' script, see the GNU 'INSTALL' file in the distribution:

```
$> less ../striso-0.9.2.1/INSTALL
```

For specific options to the '`configure`' script, see the 'INSTALL-striso' file in the distribution, or simply execute the configure script with the '`--help`' option like so:

```
$> ../striso-0.9.2.1/configure --help
```

After configuring the package, the package can be compiled simply by issuing the '`make`' command:

```
$> make
```

Some specialized makefile targets exists, see the 'README-make' file in the distribution or simply invoke the '`help`' target like so:

```
$> make help | less
```

After successfully building the package, the package can be checked by invoking the '`check`' make target like so:

```
$> make check
```

After successfully checking the package, the package can be installed by invoking the '`install`' make target (as root) like so:

```
$> sudo make install
```

The test suites that ship with the package can be invoked after the package has been installed by invoking the '`installcheck`' target. This target can either be invoked as root, or as a normal user, like so:

```
$> make installcheck
```

(Note: you must add the '`--enable-autotest`' flag to '`configure`', above for the test suites to be invoked with '`make installcheck`'.)

The package can be cleanly removed by invoking the '`uninstall`' target (as root):

```
$> sudo make uninstall
```

Then the build directory and tarball can be simply removed:

```
$> cd ..
$> rm -rf build
$> rm -rf striso-0.9.2.1
$> rm -f striso-0.9.2.1.tar.bz2
```

Detailed Installation Instructions

More detailed installation instructions can be found in the Chapter 7 [Installation], page 37, contained in the distribution in '`text`', '`info`', '`html`' and '`pdf`' formats:

```
$> cd ../striso-0.9.2.1
$> less doc/manual/striso.txt
$> lynx doc/manual/striso.html
```

```
$> info doc/manual/striso.info
$> xpdf doc/manual/striso.pdf
```

The ‘`text`’ version of the manual is always available in the ‘`MANUAL`’ file in the release.

The current manual is also always available online from *The OpenSS7 Project* website at:

```
$> lynx http://www.openss7.org/striso_manual.html
```

1 Introduction

This manual documents the design, implementation, installation, operation and future development schedule of the *OpenSS7 ISO Stack* package.

1.1 Overview

This manual documents the design, implementation, installation, operation and future development of the *OpenSS7 ISO Stack* package.

The OpenSS7 ISO Stack package is a STREAMS ISO Networking (ISO) package for Linux that can be used with *Linux Fast-STREAMS*[1]. It includes development tools, header files and manual pages for OpenSS7 ISO Stack.

1.2 Organization of this Manual

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

1.3 Conventions and Definitions

This manual uses *texinfo* typographic conventions.

[1] See section "About This Manual" in *Linux Fast-STREAMS (LfS) Reference Manual*.

2 Objective

3 Reference

3.1 Files

STRISO creates the following kernel modules files in the kernel modules directory, '`/lib/modules/2.4.20-28.7/`':[1]

'`modules.striso`'

STRISO installs the following kernel module files in the kernel modules directory, '`/lib/modules/2.4.20-28.7/striso/`':[2]

'`streams_cmot.ko`'
: This kernel module contains the *STREAMS* `cmot(4)` module.

'`streams_isot.ko`'
: This kernel module contains the *STREAMS* `isot(4)` module.

'`streams_itot.ko`'
: This kernel module contains the *STREAMS* `itot(4)` module.

'`streams_lpp.ko`'
: This kernel module contains the *STREAMS* `lpp(4)` module.

'`streams_tcpns.ko`'
: This kernel module contains the *STREAMS* `tcpns(4)` module.

'`streams_xot.ko`'
: This kernel module contains the *STREAMS* `xot(4)` module.

'`streams_clns.ko`'
: This kernel module contains the *STREAMS* `clns(4)` driver.

'`streams_x25-lapb.ko`'
: This kernel module contains the *STREAMS* `lapb(4)` driver.

'`streams_x25-plp.ko`'
: This kernel module contains the *STREAMS* `plp(4)` driver.

STRISO installs the following header files in the system include directory, '`/usr/include/striso/`':

'`xti.h`'

'`xti_osi.h`'
'`sys/xti_osi.h`'
'`xti_mosi.h`'
'`sys/xti_mosi.h`'
'`sys/striso/config.h`'
'`sys/striso/version.h`'
: This file contains kernel and system tailoring information for the '`OpenSS7 ISO Stack`' kernel modules.

---

[1] The kernel version '`2.4.20-28.7`' is just and example. For the running kernel, '`uname -r`' is expected.

[2] The kernel version '`2.4.20-28.7`' is just and example. For the running kernel, '`uname -r`' is expected.

‘2.4.20-28.7/i686/sys/striso/modversions.h’
: This file contains module and symbol version information for the ‘OpenSS7 ISO Stack’ kernel modules. This file is only applicable to *Linux* kernels in the 2.4 series.[3]

STRISO installs the following test programs in the system libexec directory, ‘/usr/libexec/striso/’:[4]

‘send-pr’
‘send-pr.config’
: The send-pr stand-alone shell script can be used for the automatic generation of problem reports for the *OpenSS7 ISO Stack* package. The ‘send-pr.config’ file provides localized definitions used by the send-pr program. For more information on problem reports, See Section 8.2 [Problem Reports], page 85, and, in particular, See Section 8.2.4 [Stand Alone Problem Reports], page 88.

‘testsuite’
‘atlocal’
: The testsuite stand-alone shell script invokes test cases in the test programs above as compiled into a comprehensive regression, troubleshooting and validation test suite for the *OpenSS7 ISO Stack* drivers. The ‘atlocal’ file provides localized definitions used by the testsuite program. For more information on test suites, See Section 8.1 [Test Suites], page 81, and, in particular, See Section 8.1.2.1 [Running Test Suites], page 85.

STRISO installs the following utility programs in the system binary directory, ‘/usr/sbin/’:

‘striso_mknod’
: This utility can be used by init scripts or administrative users to create or remove device nodes in the ‘/dev’ directory for *OpenSS7 ISO Stack* drivers.

STRISO installs the following init scripts in the system init directory, ‘/etc/rc.d/init.d/’ (non-Debian) or ‘/etc/init.d/’ (Debian):

‘striso’
: This is the name of the system init script on non-Debian based systems.

‘striso.sh’
: This is the name of the system init script on Debian based systems.

STRISO installs the following system configuration files in the configuration directory, ‘/etc/’:

‘striso.conf’
: This file provided configuration information for any system controls affected by the ‘striso’ package.

‘modutils/striso’
: This file provides module definitions and demand loading aliases for the ‘striso’ package. This file is really only applicable to older 2.4 kernels.

[3] The kernel version 2.4.20-28.7 is just for example.

[4] Note that on some systems, ‘/usr/libexec’ does not exist, and ‘/usr/lib’ is used instead.

‘`netconfig.d/striso`’
: This file provides the `netconfig(5)` definitions for the *OpenSS7 ISO Stack* drivers. `netconfig(5)` definitions are used by the ‘`strnsl`’ package and the ‘`libxnsl`’ library.

‘`sock2path.d/striso`’
: This file provides the `sock2path(5)` definitions for the *OpenSS7 ISO Stack* drivers. `sock2path(5)` definitions are used by the ‘`strsock`’ package and the ‘`libsocket`’ library.

STRISO installs the following system configuration file in the system configuration directory, ‘`/etc/sysconfig/`’ (non-Debian) or ‘`/etc/default/`’ (Debian):

‘`striso`’
: This file provides system configuration information used by init scripts for the ‘`striso`’ package. Some options of init script execution can be controlled by this file.

STRISO installs the following info files in the system info directory, ‘`/usr/share/info/`’:

‘`striso.info`’
‘`striso.info-1`’
‘`striso.info-2`’
: These files contain this manual in *GNU info* format.

STRISO installs the following manpage macros and reference database files in the system man directory, ‘`/usr/share/man/`’:[5]

‘`striso.macros`’
: This file contains manual page macro definitions included by the manual pages included in the package.

‘`striso.refs`’
: This file contains a reference database referenced by the manual pages included in the package.

STRISO installs the following manual pages in the system man directory, ‘`/usr/share/man/man4/`’:

‘`clns.4`’

‘`cmot.4`’

‘`iso-ip.4`’
‘`isos.4`’

‘`isot.4`’

‘`iso-lan.4`’
‘`iso-udp.4`’
‘`itos.4`’

‘`itot.4`’

‘`lapb.4`’

[5] Note that macro and reference databse files are not installed if the package is configured for cooked manpages.

‘lpp.4’

‘ns-tcp.4’
‘plp.4’

‘tcpns.4’

‘tp0.4’

‘tp1.4’

‘tp2.4’

‘tp3.4’

‘tp4.4’

‘tp.4’

‘x25-lapb.4’
‘x25-plp.4’
‘x25_lapb.4’
‘x25_plp.4’
‘xol.4’

‘xot.4’

STRISO installs the following manual pages in the system man directory, ‘/usr/share/man/man5/’:

‘striso.5’
: manual page for the striso(5) package.

STRISO installs the following manual pages in the system man directory, ‘/usr/share/man/man7/’:

‘npi_osi.7’

STRISO installs the following manual pages in the system man directory, ‘/usr/share/man/man8/’:

‘striso_mknod.8’
: Documentation for the striso_mknod(8) utility program.

3.2 Drivers

The *OpenSS7 ISO Stack* package provides the following *STREAMS* drivers:

clns(4) (‘streams_clns.ko’)
: Contains the clns(4) driver.

lapb(4) (‘streams_x25-lapb.ko’)
: Contains the lapb(4) driver.

plp(4) (‘streams_x25-plp.ko’)
: Contains the plp(4) driver.

3.3 Modules

The *OpenSS7 ISO Stack* package provides the following *STREAMS* modules:

`cmot(4)` (‘`streams_cmot.ko`’)
: Contains the `cmot(4)` module.

`isot(4)` (‘`streams_isot.ko`’)
: Contains the `isot(4)` module.

`itot(4)` (‘`streams_itot.ko`’)
: Contains the `itot(4)` module.

`lpp(4)` (‘`streams_lpp.ko`’)
: Contains the `lpp(4)` module.

`tcpns(4)` (‘`streams_tcpns.ko`’)
: Contains the `tcpns(4)` module.

`xot(4)` (‘`streams_xot.ko`’)
: Contains the `xot(4)` module.

3.4 Libraries

The *OpenSS7 ISO Stack* package provides the following shared object and static libraries:

The *OpenSS7 ISO Stack* package does not currently provide any libraries.

3.5 Utilities

3.5.1 Init Scripts

Following are System V Init Scripts that are installed by the package:

`striso(8)` (‘`/etc/init.d/striso`’)
`striso.sh(8)` (‘`/etc/init.d/striso.sh`’)
: System V Init Script for the *ISO* Subsystem. The `striso(8)` init script provides the ability to initialize, configure and mount the *ISO* subsystem, `strxnet(5)`. The `striso(8)` script provides the RedHat-style init script, whereas the `striso.sh(8)` script provides the Debian-style init script.

  See `striso(8)` for more information.

3.5.2 Administrative Utilities

Following are user utilities for manipulating *INET*:

The *OpenSS7 ISO Stack* package builds and installs the following utilities:

`striso_mknod`
: This is a C-language program that can be used by startup scripts to create device nodes for the ‘`striso`’ package. This utility is normally installed in the ‘`/usr/sbin`’ directory. See `striso_mknod(8)` for more information.

`striso`
: This is a *RedHat*-style System V init script that is installed and used to start and stop the ‘`striso`’ package. Starting consists of creating ISO/OSI device nodes using `striso_mknod` and installing the ‘`streams-sctp`’ and ‘`streams-tpiperf`’

modules in the running kernel. This init script is normally installed in the '`/etc/init.d`' directory.

`striso.sh`
: This is a *Debian*-style System V init script that is installed and used to start and stop the '`striso`' package in a similar fashion to the `striso` script, but in the *Debian* style. This init script is normally installed in the '`/etc/rc.d/init.d`' directory.

3.5.3 Performance Test Programs

Following are performance test programs:

The *OpenSS7 ISO Stack* package does not yet contain any performance programs. For performance testing of various transport providers, see the '`netperf-2.3.4`' package.

3.5.4 Conformance Test Programs

Following are conformance and validation test programs included in the package:

The *OpenSS7 ISO Stack* package builds and installs the following test programs:

For more information on the use of the problem reporting scripts, see Section 8.2.2 [Generating Problem Reports], page 86.

4 Development

OpenSS7 ISO Stack provides all of the header files, shared object and static libraries, manual pages and documentation necessary for the development of both user space applications programs and kernel space *STREAMS* modules and drivers based on the package. The sections that follow describe these development facilities.

4.1 Header Files

Header files are installed, typically, in the '`/usr/include/striso/`' subdirectory. To use the header files from the package, '`-I/usr/include/striso`' must be included in the `gcc` command line as a preprocessor option.

In general, '`-I`' include preprocessor directives on the `gcc` command line should be ordered in the reverse order of the dependencies between packages. So, for example, if the include files from all add-on packages are required, the order of these directives would be: '`-I/usr/include/striso`' '`-I/usr/include/strxns`' '`-I/usr/include/strcompat`' '`-I/usr/include/streams`'.

Following are the user visible header files provided by the '`striso-0.9.2.1`' package in the directory '`/usr/include/striso`':

4.1.1 User Space Programs

Typical include files for interacting with Transport providers from user space include the '`xti.h`' header file. Additional header files for interacting with specific drivers or modules may also be required. The *xti.h* header file is for interacting with the XTI library.

4.1.2 Kernel Space Drivers and Modules

Typeical include files for writing *STREAMS* module and drivers implementing transport providers in kernels space include *xti.h* and *xti_sctp.h*. The header files provide access to definitions for the TPI interface and additional XTI definitions for use by *STREAMS* drivers and modules. Additional header files for interacting with specific drivers or modules may also be required.

Aside from including this header files, the general procedures for compiling *STREAMS* modules and drivers also apply to *STREAMS* modules and drivers written to the Transport Provider Interface.

4.2 Libraries

Shared or static version of the *libxnet* library may be linked when using the '`striso-0.9.2.1`' package.[1] The library may either be specified on the `gcc` command line as a shared library (e.g. '`-lxnet`') or as a static library (e.g. '`/usr/lib/libxnet.a`').

If the shared object library is linked, include the following options on the `gcc` command line:

'`-lxnet`' Link to the '`/usr/lib/libxnet.so`' shared library.

If the static library is linked, include the following options on the `gcc` command line:

[1] Note that the '`libxnet`' library is now provided by the '`strxnet-0.9.2.9`' package.

‘`/usr/lib/libxnet.a`’
: Link to the ‘`/usr/lib/libxnet.a`’ static library.

4.3 Kernel Modules

Developing TPI kernel modules is similar to user space programs with regard to header files. ‘`/usr/include/strxnet`’ should be placed as an include directory to search on the `gcc` command line. The rules for compiling *Linux* kernel modules and the rules for compiling *STREAMS* modules and drivers should be followed. In particular, several important intricacies should be considered:

- The `gcc` compiler used to compile the kernel modules must be the same version of compiler that was used to compile the kernel and *STREAMS* base package.
- The `gcc` command line must have the same compile flags that were used to compile the kernel and *STREAMS* base package. `kbuild` can be used to accomplish this.
- The `gcc` command line must define several important kernel defines including ‘`-DLINUX`’, ‘`-D__KERNEL__`’, as well as the basename of the module. Again, `kbuild` can be used to accomplish this.
- The `gcc` command line must include several important files directly on the command line, such as, ‘`--include /lib/modules/2.4.20-28.7/build/include/linux/autoconf.h`’ and ‘`--include /lib/modules/2.4.20-28.7/build/include/linux/modversions.h`’.[2]

4.4 Manual Pages

To assist in the development of user programs and *STREAMS* driver or modules using the *OpenSS7 ISO Stack* protocol module, the following manual pages are provided:

The ‘`striso-0.9.2.1`’ package installs a number of manual pages in the ‘`/usr/share/man`’ directory as follows:

The following manual pages are installed in Section 3 of the manual (in the subdirectory ‘`/usr/share/man/man3`’):

To assist in the development of user programs and *STREAMS* driver or modules using the *OpenSS7 ISO Stack* protocol module, the following header files are provided:

[2] The kernel version, ‘`2.4.20-28.7`’, is just an example. For the running kernel, use the output of ‘`uname -r`’.

5 Conformance

Although *OpenSS7 Project* software is of high quality, and untested behaviour is often correct behaviour, the principle of the *OpenSS7 Project* is to test all functional requirements against the behaviour of the package in a repeatable validation test suite that can be used to perform regression, target architecture validation and trouble shooting, (see Section 6.4 [Maturity], page 32, and see Section 8.1 [Test Suites], page 81).

5.1 NPI Interface Conformance

The *OpenSS7 ISO Stack* drivers conform to the *Network Provider Interface (NPI) Revision 2.0.0* as released by *UNIX International*. A copy of the original document is available from The OpenSS7 Project Website. A reprint of the document specifying this version of the protocol is available as part of the '`strxns`' package available online in PDF format, or also in simple HTML format.

5.2 TPI Interface Conformance

The *OpenSS7 ISO Stack* drivers conform to the *Transport Provider Interface (TPI) Revision 2.0.0* as released by *UNIX International*. A copy of the original document is available from The OpenSS7 Project Website. A reprint of the document specifying this version of the protocol is available as part of the '`strxnet`' package available online in PDF format, or also in simple HTML format.

5.3 XTI Interface Conformance

The *OpenSS7 ISO Stack* drivers conform to the *X/Open Transport Interface/Transport Layer Interface (XTI/TLI) X/Open Networking Services (XNS) Revision 5.2* as released by *The OpenGroup*. A copy of the original document is available from The OpenGroup website. Reprints of the document are not available from The OpenSS7 Project website due to copyright restrictions. Similar information is available in the manual pages that accompany the '`strxnet`' package. These can be viewed online starting at XTI/TLI manpage.

5.4 IETF Conformance

6 Releases

This is the OpenSS7 Release of the OpenSS7 ISO Stack tools, drivers and modules used with the *Linux Fast-STREAMS* or *Linux STREAMS*[1] SVR 4.2 STREAMS releases.

The purpose of providing a separate release of this package was to separate the OpenSS7 ISO Stack tools, headers, drivers and modules from the *Linux STREAMS*[2] package for use with both *Linux STREAMS*[3] and *Linux Fast-STREAMS* in preparation for replacement of the former by the later.

The following sections provide information on OpenSS7 ISO Stack releases as well as compatibility information of OpenSS7 release to the original GCOM releases of these modules and drivers, as well as Linux kernel compatibility.

6.1 Prerequisites

The quickest and easiest way to ensure that all prerequisites are met is to download and install this package from within the *OpenSS7 Master Package*, `openss7-0.9.2.D`, instead of separately.

Prerequisites for the OpenSS7 ISO Stack package are as follows:

1. *Linux* distribution, somewhat *Linux Standards Base* compliant, with a 2.4 or 2.6 kernel and the appropriate tool chain for compiling out-of-tree kernel modules. Most recent *Linux* distributions are okay out of the box, but some development packages must be installed. For more information, see Section 6.2 [Compatibility], page 28.
   - A fairly LSB compliant GNU/Linux distribution.[4]
   - Linux 2.4 kernel (2.4.10 - 2.4.27), or
   - Linux 2.6 kernel (2.6.3 - 2.6.18);
   - glibc2 or better.
   - GNU info (for info files).
   - GNU groff (for man pages).[5]

(Note: If you acquired `striso` a part of the *OpenSS7 Master Package*, then the dependencies listed below will already have been met by unpacking the master package.)

2. *OpenSS7 Linux Fast-STREAMS*, streams-0.9.2.1.[6]
3. *OpenSS7 STREAMS Compatibility Modules*, strcompat-0.9.2.4.
4. *OpenSS7 STREAMS XNS*, strxns-0.9.2.4.

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[1] *Linux STREAMS* is buggy, unsupported and deprecated. Do not use it.

[2] *Linux STREAMS* is buggy, unsupported and deprecated. Do not use it.

[3] *Linux STREAMS* is buggy, unsupported and deprecated. Do not use it.

[4] See Section 6.2.1 [GNU/Linux Distributions], page 28, for more information.

[5] 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.

[6] Although, at one time, this package supported *LiS*, *LiS* is now deprecated and unsupported.

5. *OpenSS7 STREAMS XTI/TLI*, strxnet-0.9.2.9.
6. *OpenSS7 STREAM Network Services Library*, strnsl-0.9.2.1. (Optional.)
7. *OpenSS7 STREAMS Sockets*, strsock-0.9.2.1. (Optional.)
8. *OpenSS7 STREAMS INET*, strinet-0.9.2.4.
9. *OpenSS7 STREAMS SCTP*, strsctp-0.9.2.6.
10. *OpenSS7 STREAMS Channels*, striso-0.9.2.1.

If you need to rebuild the package from sources with modifications, you will need a larger GNU toolchain as described in See Section 7.1.6 [Downloading from CVS], page 45.

6.2 Compatibility

This section discusses compatibility with major prerequisites.

6.2.1 GNU/Linux Distributions

OpenSS7 ISO Stack is compatible with the following *Linux* distributions:[7]

- CentOS Enterprise Linux 3.4 (centos34)
- CentOS Enterprise Linux 4.0 (centos4)
- Debian 3.0r2 Woody (deb3.0) – TBD
- Debian 3.1r0a Sarge (deb3.1)
- Fedora Core 1 (FC1) – TBD
- Fedora Core 2 (FC2) – TBD
- Fedora Core 3 (FC3) – TBD
- Fedora Core 4 (FC4)
- Fedora Core 5 (FC5)
- Gentoo 2006.1 (untested)
- Lineox 4.026 (LEL4) – TBD
- Lineox 4.053 (LEL4)
- Mandrakelinux 9.2 (MDK92) – TBD
- Mandrakelinux 10.0 (MDK100) – TBD
- Mandrakelinux 10.1 (MDK101) – TBD
- Mandriva Linux LE2005 (MDK102) – TBD
- Mandriva Linux LE2006 (MDK103)
- Mandriva One (untested)
- Performance Technlogies *NexusWare24* – TBD
- Performance Technologies NexusWare 8.0
- RedHat Linux 7.2 (RH7)
- RedHat Linux 7.3 (RH7)
- RedHat Linux 8.0 (RH8) – TBD

[7] Items marked as '`TBD`' are scheduled to have support deprecated. That is, in a future release, the distributions marked '`TBD`' will not longer be validated before release.

- RedHat Linux 9 (RH9) – TBD
- RedHat Enterprise Linux 3.0 (EL3)
- RedHat Enterprise Linux 4 (EL4)
- SuSE 8.0 Professional (SuSE8.0) – TBD
- SuSE 9.1 Personal (SuSE9.1) – TBD
- SuSE 9.2 Professional (SuSE9.2) – TBD
- SuSE OpenSuSE (SuSEOSS)
- SuSE 10.0 (SuSE10.0)
- SuSE 10.1 (SuSE10.1)
- SLES 9 (SLES9)
- SLES 9 SP2 (SLES9)
- SLES 9 SP3 (SLES9)
- SLES 10 (SLES10)
- Ubuntu 5.10 (ubu5.10)
- Ubuntu 6.06 LTS (ubu6.06)
- WhiteBox Enterprise Linux 3.0 (WBEL3)
- WhiteBox Enterprise Linux 4 (WBEL4)

When installing from the tarball (see Section 7.4.3 [Installing the Tar Ball], page 68), 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.

6.2.2 Kernel

The *OpenSS7 ISO Stack* package compiles as a *Linux* kernel module. It is not necessary to patch the *Linux* kernel to build or use the package.[8] Nor do you have to recompile your kernel to build or use the package. OpenSS7 packages use `autoconf` scripts to adapt the package source to your existing kernel. The package builds and runs nicely against production kernels from the distributions listed above. Rather than relying on kernel versions, the `autoconf` scripts interrogate the kernel for specific features and variants to better adapt to distribution production kernels that have had patches applied over the official kernel.org sources.

The *OpenSS7 ISO Stack* package is compatible with 2.4 kernel series after 2.4.10 and has been tested up to and including 2.4.27. It has been tested from 2.6.3 up to and including 2.6.18 (with Fedora Core 5 patchsets). Please note that your mileage may vary if you use a kernel more recent than 2.6.18: it is difficult to anticipate changes that kernel developers will make in the future. Many kernels in the 2.6 series now vary widely by release version and if you encounter problems, try a kernel within the supported series.

UP validation testing for kernels is performed on all supported architectures. SMP validation testing is performed on UP machines, as well as on an Intel 3.0GHz Pentium IV 630 with HyperThreading enabled. Because HyperThreading is not as independent as multiple CPUs, SMP validation testing is limited.

[8] At a later date, it is possible to move this package into the kernel, however, with continued resistance to STREAMS from within the *Linux* developer community, this is currently unlikely.

6.2.3 Architectures

The *OpenSS7 ISO Stack* package compiles and installs on a wide range of architectures. Although it is believed that the package will work on all architectures supported by the Linux kernel being used, validation testing has only been performed with the following architectures:

- ix86
- x86_64
- ppc (MPC 860)
- ppc64

32-bit compatibility validation testing is performed on all 64-bit architectures supporting 32-bit compatibility. If you would like to validate an OpenSS7 package on a specific machine architecture, you are welcome to sponsor the project with a test machine.

6.2.4 Linux STREAMS

The *OpenSS7 ISO Stack* package is currently compatible with *Linux STREAMS*,[9] however, to use the *OpenSS7 ISO Stack* package with *LiS* requires use of the OpenSS7 release packages of *LiS*. The *OpenSS7 ISO Stack* package is compatible with the OpenSS7 **LiS-2.18.4** release that is available from the The OpenSS7 Project Downloads Page. But, do not use *LiS*: it is buggy, unsupported and deprecated. Use *Linux Fast-STREAMS* instead.

6.2.5 Linux Fast-STREAMS

The *OpenSS7 ISO Stack* package is currently compatible with *Linux Fast-STREAMS (LfS)*. The *OpenSS7 ISO Stack* package is compatible with the OpenSS7 **streams-0.7a.6** release that is available from the The OpenSS7 Project Downloads Page.

6.3 Release Notes

The sections that follow provide information on OpenSS7 releases of the OpenSS7 ISO Stack package.

Initial release striso-0.9.2.1

Initial autoconf/RPM packaging of the `striso` release.

This is the initial open source release of the *OpenSS7 ISO Stack* package. This release contains modules and drivers formerly only available with Commercial releases of the '`strss7`' package and which are only recently available as open source with the release of this package.

With OpenSS7 Master Package release '`openss7-0.9.2.D`', the ISO/OSI components were separated from the '`strss7`' package and placed in this package. Not all of the ISO/OSI components previously part of the '`strss7`' package have been strapped into this release. Components will be re-validated against *Linux Fast-STREAMS* on a module-by-module and driver-by-driver basis. See '`TODO`' in the release, or Section 6.6 [Schedule], page 34, for information about the release schedule.

In this initial release, the major component first available is LAPB. `lapb(4)` is a pushable *STREAMS* module that is pushed over a `cdi(4)` HDLC channel to form an X.25 data link

[9] *Linux STREAMS* is buggy, unsupported and deprecated. Do not use it.

providing the Data Link Provider Interface, `dlpi(7)`. A complete test suite will be available in a further release.

Subsequent releases in 1Q 2007 will include the additional full ISO/OSI X.25< CONS, CLNS, and TP0 through TP4, drivers with conformance test suites.

This is the initial public alpha release of the package. Please see 'README-alpha' in the release or Section 6.4 [Maturity], page 32.

This package is currently incomplete. It is being released as a reference point for the community. If you are interested in completion of this package, contact `info@openss7.com`.

As with other OpenSS7 releases, this release configures, compiles, installs and builds RPMs and DEBs for a wide range of Linux 2.4 and 2.6 RPM-based or dpkg-based distributions, and can be used on production kernels without patching or recompiling the kernel.

This package is publicly released under the *GNU General Public License Version 2*. The release is available as an `autoconf` tarball, SRPM, DSC, and set of binary RPMs or DEBs. See the download page for the `autoconf` tarballs, SRPMs and DSCs. See the striso package page for tarballs, SRPMs, DSCs and binary RPMs or DEBs.

See `http://www.openss7.org/codefiles/striso-0.9.2.1/ChangeLog` and `http://www.openss7.org/codefiles/striso-0.9.2.1/NEWS` in the release for more information. Also, see the '`striso.pdf`' manual in the release (also in html `http://www.openss7.org/striso_manual.html`).

Initial release striso-0.9.2.1.rc3

Third release candidate.

- Now builds 32-bit compatibility libraries and tests them against 64-bit kernel modules and drivers. The '`make installcheck`' target will now automatically test both 64-bit native and 32-bit compatibility versions, one after the other, on 64-bit platforms.
- Added versioning of all library symbols.
- Many documentation updates for all OpenSS7 packages. Automated release file generation making for vastly improved and timely text documentation present in the release directory.
- Dropped support for *LiS*.
- Updated `init` scripts for proper addition and removal of modules.
- Start assigning majors at major device number 231 instead of major device number 230. Assign major device number 230 explicitly to the clone device. Package will now support extended ranges of minor devices on 2.6 kernels under *Linux Fast-STREAMS* only. *striso* now supports expanded addressable minor device numbers, permitting 2^16 addressable minor devices per major device number on 2.6 kernels: *LiS* cannot support this change.
- Better detection of SUSE distributions, release numbers and SLES distributions: support for additional *SuSE* distributions on `ix86` as well as `x86_64`. Added distribution support includes *SLES 9*, *SLES 9 SP2*, *SLES 9 SP3*, *SLES 10*, *SuSE 10.1*.
- Improved compiler flag generation and optimizations for recent `gcc` compilers and some idiosyncratic behaviour for some distributions (primarily SUSE).
- Optimized compilation is now available also for user level programs in addition to kernel programs. Added new '`--with-optimize`' option to `configure` to accomplish this.

- Added `--disable-devel configure` option to suppress building and installing development environment. This feature is for embedded or pure runtime targets that do not need the development environment (static libraries, manual pages, documentation).
- Added `send-pr` script for automatic problem report generation.
- The package will now build doxygen(1) html documentation with the 'doxy' make target. See 'make help' or README-make in the distribution for more information.

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

Initial release striso-0.9.2.1.rc2

Second release candidate.

- Added '`--enable-devel`' `configure` option for embedded targets.
- Added `send-pr` script for automatic problem report generation.

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

Initial release striso-0.9.2.1rc1

First release candidate.

- Initial package skeleton including *Installation and Reference Manual* and all necessary files and directories.

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

6.4 Maturity

The *OpenSS7 Project* adheres to the following release philosophy:

- pre-alpha release
- alpha release
- beta release
- gamma release
- production release
- unstable release

6.4.1 Pre-Alpha Releases

Pre-alpha releases are releases that have received no testing whatsoever. Code in the release is not even known to configure or compile. The purpose of a pre-alpha release is to make code and documenation available for insepection only, and to solicit comments on the design approach or other characteristics of the software package.

Pre-alpha release packages ship containing warnings recommending that the user not even execute the contained code.

6.4.2 Alpha Releases

Alpha releases are releases that have received little to no testing, or that have been tested and contains known bugs or defects that make the package unsuitable even for testing. The purpose for an *alpha* release are the same as for the pre-alpha release, with the additional

purpose that it is an earily release of partially functional code that has problems that an external developer might be willing to fix themselves and contribute back to the project.

Alpha release packages ship containing warnings that executing the code can crash machines and might possibly do damage to systems upon which it is executed.

6.4.3 Beta Releases

Beta releases are releases that have received some testing, but the testing to date is not exhaustive. *Beta* release packages do not ship with known defects. All known defects are resolved before distribution; however, as exhaustive testing has not been performed, unknown defects may exist. The purpose for a *beta* release is to provide a baseline for other organizations to participate in the rigorous testing of the package.

Beta release packages ship containing warnings that the package has not been exhaustively tested and that the package may cause systems to crash. Suitability of software in this category for production use is not advised by the project; however, as always, is at the discretion of the user of the software.

6.4.4 Gamma Releases

Gamma releases are releases that have received exhaustive testing within the project, but external testing has been minimal. *Gamma* release packages do not ship with known defects. As exhaustive internal testing has been performed, unknown defects should be few. Please remember that there is NO WARRANTY on public release packages.

Gamma release packages typically resolve problems in previous *beta* releases, and might not have had full regression testing performed. Suitability of software in this category for production use is at the discretion of the user of the software. *The OpenSS7 Project* recommends that the complete validation test suites provided with the package be performed and pass on target systems before considering production use.

6.4.5 Production Releases

Production releases are releases that have received exhaustive testing within the project and validated on specific distributions and architectures. *Production* release packages do not ship with known defects. Please remember that there is NO WARRANTY on public release packages.

Production packages ship containig a list of validated distributions and architecutres. Full regression testing of any maintenance changes is performed. Suitability of software in this category for production use on the specified target distributions and architectures is at the discretion of the user. It should not be necessary to preform validation tests on the set of supported target systems before considering production use.

6.4.6 Unstable Releases

Unstable releases are releases that have received extensive testing within the project and validated on a a wide range of distributions and architectures; however, is has tested unstable and found to be suffering from critical problems and issues that cannot be resolved. Maintenance of the package has proven impossible. *Unstable* release packages ship with known defects (and loud warnings). Suitability of software in this category for production use is at the discretion of the user of the software. *The OpenSS7 Project* recommends

that the problems and issues be closely examined before this software is used even in a non-production evironment. Each failing test scenario should be completely avoided by the application. *OpenSS7* beta software is more stable that software in this category.

6.5 Bugs

6.5.1 Defect Notices

OpenSS7 ISO Stack has known and unknown defects. This is a *pre-alpha* release. Some defects might be harmful. No validation testing whatsoever has been performed by the *OpenSS7 Project* on this software. The software might not even configure or compile. The *OpenSS7 Project* recommends that you **do not use this software**. Use at your own risk. Remember that there is **NO WARRANTY**.[10]

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

6.5.2 Known Defects

With the exception of packages not originaly created by the *OpenSS7 Project*, the *OpenSS7 Project* software does not ship with known bugs in any release stage except *pre-alpha*. *OpenSS7 ISO Stack* had no known bugs at the time of release.

6.5.3 Defect History

This section contains historical bugs that were encountered during development and their resolutions. This list serves two purposes:

1. It captures bugs encountered between releases during development that could possibly reoccur (and the Moon is made of blue cheese). It therefore provides a place for users to look if they encounter a problem.
2. It provides a low overhead bug list between releases for developers to use as a '`TODO`' list.

Bugs

`(no items)`

6.6 Schedule

Things to do:

– Testing. This package is completely untested.
todo

– Create `isot(4)`, `itot(4)`, `lpp(4)` and `cmot(4)` *STREAMS* modules and drivers.
todo

[10] See section **NO WARRANTY** under [GNU General Public License], page 92.

– Move already written code from the ‘`stacks`’ or ‘`strss7`’ directories into the ‘`src`’ directory.

  todo

– Create a skeleton directory and manual and place `striso` as a subpackage in the *OpenSS7 Master Package*.

  done You are reading it.

The purpose of the package was to move *STREAMS* ISO networking capabilities outside of the ‘`strss7`’ release package. The `striso` package is currently incomplete. If you are interested in the completion of this add-on package, contact `info@openss7.com`.

6.7 History

For the latest developments with regard to history of changes, please see the ‘`ChangeLog`’ file in the release package.

7 Installation

7.1 Downloading

The OpenSS7 ISO Stack 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 `striso` from the links in the sections that follow.

By far the easiest (most repeatable and manageable) form for installing and using *OpenSS7* packages is to download and install individual packages from binary RPM or DEB. If binary RPMs or DEBs are not available for your distribution, but your distribution supports `rpm(1)` or `dpkg(1)`, the next best method for installing and using *OpenSS7* packages is to download and rebuild the source RPMs or DSCs.

If your architecture does not support `rpm(1)` or `dpkg(1)` 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 tarball. In this later case, the easiest way to build and install *OpenSS7* packages from tarball is to use the tarball for the *OpenSS7 Master Package*, `openss7-0.9.2.D`.

7.1.1 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, as applicable. Some release packages do not provide RPMs in each of the several categories.

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 dependent on neither the Linux kernel version, nor the *STREAMS* package. For example, the source package '`striso-source-0.9.2.1-1.7.2.noarch.rpm`', is not dependent on kernel nor *STREAMS* package.

All of the following kernel and *STREAMS* 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 7.3.1 [Building from the Source RPM], page 63).

Architecture Independent

striso-dev-0.9.2.1-1.7.2.noarch.rpm

The '`striso-dev`' package contains the device definitions necessary to run applications programs developed for OpenSS7 ISO Stack.[1]

[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(1)`. 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.

striso-doc-0.9.2.1-1.7.2.noarch.rpm
: The '`striso-doc`' package contains this manual in plain text, postscript, '`pdf`' and '`html`' forms, along with the meta-information from the '`striso`' package. It also contains all of the manual pages necessary for developing OpenSS7 ISO Stack applications and OpenSS7 ISO Stack *STREAMS* modules or drivers.

striso-init-0.9.2.1-1.7.2.noarch.rpm
: The '`striso-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.

striso-source-0.9.2.1-1.7.2.noarch.rpm
: The '`striso-source`' package contains the source code necessary for building the OpenSS7 ISO Stack release. It includes the `autoconf(1)` configuration utilities necessary to create and distribute tarballs, '`rpm`' and '`deb`'/'`dsc`'.[2]

Architecture Dependent

striso-devel-0.9.2.1-1.7.2.i686.rpm
: The '`striso-devel`' package contains library archives for static compilation, header files to develop OpenSS7 ISO Stack modules and drivers. This also includes the header files and static libraries required to compile OpenSS7 ISO Stack applications programs.

striso-lib-0.9.2.1-1.7.2.i686.rpm
: The '`striso-lib`' package contains the run-time shared libraries necessary to run application programs and utilities developed for the '`striso`' package.[3]

STREAMS-Dependent RPM

STREAMS-Dependent RPM are dependent upon the specific *STREAMS* package being used, either *Linux STREAMS* or *Linux Fast-STREAMS*. Packages dependent upon *Linux STREAMS* will have '`LiS`' in the package name. Packages dependent upon *Linux Fast-STREAMS* will have '`streams`' in the package name. Note that some *STREAMS*-Dependent RPM are also Kernel-Dependent RPM as described below.

One of the following *STREAMS*-Dependent packages is required for your architecture. If your architecture is not on the list, you can build binary RPM from the source RPM (see see Section 7.3.1 [Building from the Source RPM], page 63).

striso-LiS-util-0.9.2.1-1.7.2.i686.rpm
: The '`striso-LiS-util`' package provides administrative and configuration test utilities and commands associated with the OpenSS7 ISO Stack package. Because this package must link a *STREAMS*-specific library, it is a *STREAMS*-Dependent package. Use the '`striso-LiS-util`' package if you have *LiS* installed.

---

[2] Note that not all releases have source RPM packages. Release packages that do not contain kernel modules do not generate a source RPM package.

[3] Note that not all release packages contain shared libraries, and, therefore, not all release packages contain this package.

striso-streams-util-0.9.2.1-1.7.2.i686.rpm

The '`striso-streams-util`' package provides administrative and configuration test utilities and commands associated with the OpenSS7 ISO Stack package. Because this package must link a *STREAMS*-specific library, it is a *STREAMS*-Dependent package. Use the '`striso-streams-util`' package if you have streams installed.

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 *RedHat* 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 7.3.1 [Building from the Source RPM], page 63).[4]

striso-core-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-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 '`2.4.20-28.7`'.[5]

striso-info-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-info`' package[6] 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 '`2.4.20-28.7`'.[7]

striso-LiS-core-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-LiS-core`' package contains the kernel modules that provide the OpenSS7 ISO Stack *STREAMS* modules and drivers. This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`LiS`' (*Linux STREAMS*) on kernel version '`2.4.20-28.7`'.[8]

striso-streams-core-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-streams-core`' package contains the kernel modules that provide the OpenSS7 ISO Stack *STREAMS* modules and drivers. This package is

[4] 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.

[5] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example. Note also that only release packages that contain kernel modules will contain a '`core`' subpackage.

[6] 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.

[7] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[8] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`streams`' (*Linux Fast-STREAMS*) on kernel version '`2.4.20-28.7`'.[9]

striso-LiS-info-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-LiS-info`' package[10] contains the module symbol version information for the '`LiS-core`' subpackage, above. It is possible to load this subpackage and compile modules that use the exported symbols without loaded the actual kernel modules (from the '`LiS-core`' subpackage above). This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`LiS`' (*Linux STREAMS*) on kernel version '`2.4.20-28.7`'.[11]

striso-streams-info-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm

The '`striso-streams-info`' package[12] contains the module symbol version information for the '`streams-core`' subpackage, above. It is possible to load this subpackage and compile modules that use the exported symbols without loaded the actual kernel modules (from the '`streams-core`' subpackage above). This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`streams`' (*Linux Fast-STREAMS*) on kernel version '`2.4.20-28.7`'.[13]

Configuration and Installation

To configure, build and install the binary RPM, See Section 7.2.1 [Configuring the Binary RPM], page 47.

7.1.2 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, as applicable. Some release packages do not provide DEBs in each of the several categories.

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 dependent on neither the Linux kernel version, nor the *STREAMS* package. For example, the source package '`striso-source_0.9.2.1-0_i386.deb`', is not dependent on kernel nor *STREAMS* package.

All of the following kernel and *STREAMS* independent DEB are required for your architecture. Binary DEBs listed here are for example only: additional binary DEBs are available

[9] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[10] Note that only release packages that contain kernel modules and that export versioned symbols will contain a '`LiS-info`' subpackage.

[11] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[12] Note that only release packages that contain kernel modules and that export versioned symbols will contain a '`streams-info`' subpackage.

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

from the downloads site. If your architecture is not available, you can build binary DEB from the Debian DSC (see see Section 7.3.2 [Building from the Debian DSC], page 63).

Architecture Independent

striso-dev_0.9.2.1-0_all.deb
: The '`striso-dev`' package contains the device definitions necessary to run applications programs developed for OpenSS7 ISO Stack.[14]

striso-doc_0.9.2.1-0_all.deb
: The '`striso-doc`' package contains this manual in plain text, postscript, '`pdf`' and '`html`' forms, along with the meta-information from the '`striso`' package. It also contains all of the manual pages necessary for developing OpenSS7 ISO Stack applications and OpenSS7 ISO Stack *STREAMS* modules or drivers.

striso-init_0.9.2.1-0_all.deb
: The '`striso-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.

striso-source_0.9.2.1-0_all.deb
: The '`striso-source`' package contains the source code necessary for building the OpenSS7 ISO Stack release. It includes the `autoconf(1)` configuration utilities necessary to create and distribute tarballs, rpms and deb/dscs.[15]

Architecture Dependent

striso-devel_0.9.2.1-0_i386.deb
: The '`striso-devel`' package contains library archives for static compilation, header files to develop OpenSS7 ISO Stack modules and drivers. This also includes the header files and static libraries required to compile OpenSS7 ISO Stack applications programs.

striso-lib_0.9.2.1-0_i386.deb
: The '`striso-lib`' package contains the run-time shared libraries necessary to run application programs and utilities developed for the '`striso`' package.[16]

STREAMS-Dependent DEB

STREAMS-Dependent DEB are dependent upon the specific *STREAMS* package being used, either *Linux STREAMS* or *Linux Fast-STREAMS*. Packages dependent upon *Linux STREAMS* will have '`LiS`' in the package name. Packages dependent upon *Linux Fast-STREAMS* will have '`streams`' in the package name. Note that some *STREAMS*-Dependent DEB are also Kernel-Dependent DEB as described below.

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[14] 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.

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

[16] Note that not all release packages contain shared libraries, and, therefore, not all release packages contain this package.

One of the following *STREAMS*-Dependent packages is required for your architecture. If your architecture is not on the list, you can build binary DEB from the Debian DSC (see see Section 7.3.2 [Building from the Debian DSC], page 63).

striso-LiS-util_0.9.2.1-0_i386.deb
: The '`striso-LiS-util`' package provides administrative and configuration test utilities and commands associated with the OpenSS7 ISO Stack package. Because this package must link a *STREAMS*-specific library, it is a *STREAMS*-Dependent package. Use the '`striso-LiS-util`' package if you have *LiS* installed.

striso-streams-util_0.9.2.1-0_i386.deb
: The '`striso-streams-util`' package provides administrative and configuration test utilities and commands associated with the OpenSS7 ISO Stack package. Because this package must link a *STREAMS*-specific library, it is a *STREAMS*-Dependent package. Use the '`striso-streams-util`' package if you have streams installed.

Kernel-Dependent DEB

Kernel-Dependent DEB are dependent on specific Linux Kernel Binary DEB releases. Packages are provided for popular released *Debian* kernels. Packages dependent upon *Debian* 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 7.3.2 [Building from the Debian DSC], page 63).[17]

striso-core-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-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 '`2.4.20-28.7`'.[18]

striso-info-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-info`' package[19] 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 '`2.4.20-28.7`'.[20]

---

[17] 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.

[18] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example. Note also that only release packages that contain kernel modules will contain a '`core`' subpackage.

[19] 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.

[20] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

striso-LiS-core-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-LiS-core`' package contains the kernel modules that provide the OpenSS7 ISO Stack *STREAMS* modules and drivers. This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`LiS`' (*Linux STREAMS*) on kernel version '`2.4.20-28.7`'.[21]

striso-streams-core-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-streams-core`' package contains the kernel modules that provide the OpenSS7 ISO Stack *STREAMS* modules and drivers. This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`streams`' (*Linux Fast-STREAMS*) on kernel version '`2.4.20-28.7`'.[22]

striso-LiS-info-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-LiS-info`' package[23] contains the module symbol version information for the '`LiS-core`' subpackage, above. It is possible to load this subpackage and compile modules that use the exported symbols without loaded the actual kernel modules (from the '`LiS-core`' subpackage above). This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`LiS`' (*Linux STREAMS*) on kernel version '`2.4.20-28.7`'.[24]

striso-streams-info-2.4.20-28.7_0.9.2.1-0_i386.deb
: The '`striso-streams-info`' package[25] contains the module symbol version information for the '`streams-core`' subpackage, above. It is possible to load this subpackage and compile modules that use the exported symbols without loaded the actual kernel modules (from the '`streams-core`' subpackage above). This package is heavily tied to the *STREAMS* package and kernel for which it was compiled. This particular package applies to '`streams`' (*Linux Fast-STREAMS*) on kernel version '`2.4.20-28.7`'.[26]

Configuration and Installation

To configure, build and install the Debian DEB, See Section 7.2.2 [Configuring the Debian DEB], page 48.

7.1.3 Downloading the Source RPM

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

---

[21] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[22] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[23] Note that only release packages that contain kernel modules and that export versioned symbols will contain a '`LiS-info`' subpackage.

[24] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[25] Note that only release packages that contain kernel modules and that export versioned symbols will contain a '`streams-info`' subpackage.

[26] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

striso-0.9.2.1-1.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, for either *Linux STREAMS* or *Linux Fast-STREAMS*.

Configuration

To configure the source RPM, See Section 7.2.3 [Configuring the Source RPM], page 49.

7.1.4 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.

striso_0.9.2.1-0.dsc
striso_0.9.2.1-0.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, for either *Linux STREAMS* or *Linux Fast-STREAMS*.

Configuration

To configure the source RPM, See Section 7.2.4 [Configuring the Debian DSC], page 52.

7.1.5 Downloading the Tar Ball

For non-`rpm(1)` architectures, such as *NexusWare* embedded target, download the tarball as follows:

striso-0.9.2.1.tar.gz
striso-0.9.2.1.tar.bz2
: These are the `tar(1)` balls for the release. These `tar(1)` balls contain the `autoconf(1)` 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(1)` architectures and Debian DSC and DEB on `dpkg(1)` architectures.

The tar ball may be downloaded easily with `wget(1)` as follows:

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
```

or

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.gz
```

Note that you will need an *OpenSS7 Project* user name and password to download release candidates (which are only available to subscribers and sponsors of the *OpenSS7 Project*).

Unpacking the Archive

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

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.gz
% tar -xzvf striso-0.9.2.1.tar.gz
```

or

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
```

Either will create a subdirectory name '`striso-0.9.2.1`' containing all of the files and subdirectories for the `striso` package.

Configuration

To configure and install the tar ball, See Section 7.2.5 [Configuring the Tar Ball], page 53.

7.1.6 Downloading from CVS

If you are a subscriber or sponsor of The OpenSS7 Project with CVS archive access privileges then you can download release, mid-release or release candidate versions of the '`striso`' package from the project CVS archive.

The OpenSS7 ISO Stack package is located in the '`striso`' module of '`/var/cvs`'. For release tag information, see Chapter 6 [Releases], page 27.

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 striso_0.9.2.1 striso
% cvs logout
```

It is, of course, possible to check out by date or by other criteria. For more information, see `cvs(1)`.

Preparing the CVS Working Directory

Although public releases of the '`striso`' 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 1.9.6`
- `libtool 1.5.22`
- `gettext 0.14.5`

It should be stressed that, in particular, the `autoconf(1)`, and `automake(1)`, 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.*[27] GNU version of these packages

[27] A notable exception is Debian.

configured and installed to default directories will install in '`/usr/local/`' allowing them to coexist with distribution installed versions.

For building documentation, the build host also requires the following documentation tools:

- `gs 8.15`
- `tetex 3.0`
- `texinfo 4.8`
- `transfig 3.2.5`
- `imagemagick 6.2.4`
- `groff 1.17.2`

Most desktop GNU/Linux distributions will have these tools; however, some server-style installations (e.g. *Ubuntu*-server or *SLES 9*) will not and they must be installed separately.

For uncooked manual pages, the entire `groff(1)` package is required on *Debian* and *Ubuntu* systems (the base package does not include `grefer(1)` which is used extensively by uncooked manual pages). The following will get what you need:

```
Debian: % apt-get install groff_ext
Ubuntu: % apt-get install groff
```

In addition, the build host requires a complete tool chain for compiling for the target host, including kernel tools such as `genksyms(8)` and others.

If you wish to package '`rpms`' on an `rpm(1)` system, or '`debs`' on a `dpkg(1)` system, you will need the appropriate tool chain. Systems based on `rpm(1)` typically have the necessary tool chain available, however, `dpkg(1)` systems do not. The following on a *Debian* or *Ubuntu* system will get what you need:

```
% apt-get install debhelper
% apt-get install fakeroot
```

To generate a configuration script and the necessary scriptlets required by the GNU `autoconf(1)` system, execute the following commands on the working directory:

```
% autoreconf -fiv striso
```

where, '`striso`' 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 striso
```

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 7.2.5 [Configuring the Tar Ball], page 53, and Section 7.3.3 [Building from the Tar Ball], page 64.

Do note, however, that `make(1)` will rebuild the documentation that is normally released with the package. Additional tools may be necessary for building the documentation. To avoid building and installing the documentation, use the '`--disable-devel`' option to configure described in Section 7.2.5 [Configuring the Tar Ball], page 53.

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`', '`--enable-dependency-tracking`' and '`--disable-devel`'. The first of these three options will add maintainer-specific targets to any generated '`Makefile`', the second option will invoke automatic dependency tracking within the '`Makefile`' so rebuilds after changes to macro, source or documentation files will be automatically rebuilt; and the last option will suppress rebuilding and reinstalling documentation manual pages and header files. Header files will still be available under the '`/usr/src`' directory.

7.2 Configuration

7.2.1 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:

'`striso-LiS-core-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm`'
'`striso-streams-core-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm`'

'`/lib/modules/2.4.20-28.7`'
: This relocatable directory contains the kernel modules that provide the striso *STREAMS* core, drivers and modules.[28]

'`striso-LiS-info-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm`'
'`striso-streams-info-2.4.20-28.7-0.9.2.1-1.7.2.i686.rpm`'

'`/usr/include/striso/2.4.20-28.7`'
: This relocatable directory contains the kernel module exported symbol information that allows other kernel modules to be compiled against the correct version of the striso package.[29]

'`striso-dev-0.9.2.1-1.7.2.i686.rpm`'
: (not relocatable)

'`striso-devel-0.9.2.1-1.7.2.i686.rpm`'

'`/usr/lib`'
: This relocatable directory contains striso libraries.

[28] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

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

‘/usr/include/striso’
: This relocatable directory contains striso header files.

‘striso-doc-0.9.2.1-1.7.2.i686.rpm’

‘/usr/share/doc’
: This relocatable directory contains all package specific documentation (including this manual). The subdirectory in this directory is the ‘striso-0.9.2.1’ 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.

‘striso-LiS-lib-0.9.2.1-1.7.2.i686.rpm’
‘striso-streams-lib-0.9.2.1-1.7.2.i686.rpm’

‘/usr/lib’
: This relocatable directory contains the run-time shared libraries necessary to run applications programs and utilities developed for OpenSS7 ISO Stack.

‘/usr/share/locale’
: This relocatable directory contains the locale information for shared library files.

‘striso-source-0.9.2.1-1.7.2.i686.rpm’

‘/usr/src’
: This relocatable directory contains the source code.

‘striso-LiS-util-0.9.2.1-1.7.2.i686.rpm’
‘striso-streams-util-0.9.2.1-1.7.2.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 7.4.1 [Installing the Binary RPM], page 67.

7.2.2 Configuring the Debian DEB

In general the binary DEB do not require any configuration.

Installation

To install the Debian DEB, See Section 7.4.2 [Installing the Debian DEB], page 68.

7.2.3 Configuring the Source RPM

When building from the source RPM (see Section 7.3.1 [Building from the Source RPM], page 63), the rebuild process uses a number of macros from the user's '`.rpmmacros`' file as described in `rpm(8)`.

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 7.3.1 [Building from the Source RPM], page 63), it is possible to pass a number of additional configuration options to the rpmbuild(1) 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"
```

This is a generic description of common rpmbuild(1) options. Not all rpmbuild(1) options are applicable to all SRPMs. Options that are kernel module specific are only applicable to SRPMs that build kernel modules. *STREAMS* options are only applicable to SRPMs that provide or require *STREAMS*.

`--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 automake(1). 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(1) references in manual pages.[30] This option will cook soelim(1), refer(1), tbl(1) and pic(1) commands from the man-

[30] In particular, some *Debian* systems do not load the groff(1) extensions package and do not have grefer(1) installed. Although this is an oversight on the configuration of the particular *Debian* system, we accomodate such misconfiguration with this feature.

ual pages and also strip groff(1) comments. The default is to leave manual pages uncooked: they are actually smaller that way.

--with public
--without public
: Release public packages or private packages. This option has no effect on the 'striso' 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.

--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 saftey 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 placed 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 7.2.5 [Configuring the Tar Ball], page 53.

--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 file system daemon enabled system with autoloading, or not. The default is to build for devfsd(1) 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 devel`
`--without devel`
: Specifies whether to build development environment packages such as those that include header files, static libraries, manual pages and `texinfo(1)` documentation. The default is to build development environment packages. This option can be useful when building for an embedded target where only the runtime components are desired.

`--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(1)` 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(1)` target uses this feature to rebuild for all available architectures and kernels.

`--with lis`
`--without lis`
: Specifies that the package is to be rebuilt against *Linux STREAMS*. The default is to automatically identify whether '`LiS`' or '`streams`' is loaded on the build system and build accordingly.

`--with lfs`
`--without lfs`
: Specifies that the package is to be rebuilt against *Linux Fast-STREAMS*. The default is to automatically identify whether '`LiS`' or '`streams`' is loaded on the build system and build accordingly.

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 7.3.1 [Building from the Source RPM], page 63.

7.2.4 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 7.2.5 [Configuring the Tar Ball], page 53. For an example, See Section 7.3.2 [Building from the Debian DSC], page 63.

Build

To build from the Debian DSC, See Section 7.3.2 [Building from the Debian DSC], page 63.

7.2.5 Configuring the Tar Ball

All of the normal GNU autoconf(1) configuration options and environment variables apply. Additional options and environment variables are provided to tailor or customize the build and are described below.

7.2.5.1 Configure Options

This is a generic description of common '`configure`' options that are in addition to those provided by autoconf(1), automake(1), libtool(1) and gettext(1).

Not all '`configure`' options are applicable to all release packages. Options that are kernel module specific are only applicable to release packages that build kernel modules. *STREAMS* options are only applicable to release packages that provide or require *STREAMS*.

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

`--enable-checks`
`--disable-checks`
: Enable or disable preinstall checks. Each release package supports a number of preinstall checks that can be performed by invoking the '`check`' target with make(1). 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.

`--enable-autotest`
`--disable-autotest`
: Enable or disable pre- and post-installation testing. Each release package supports a number of `autotest` test suites that can be performed by invoking the '`installcheck`' target with make(1). These currently consist of running installed modules, commands and binaries against a number of specific test cases. Normally these checks are only run in maintainer mode, but can be enabled and disabled with this option.

`--disable-compress-manpages`
: Compress manual pages with '`gzip -9`' or '`bzip2 -9`' or leave them uncompressed. The default is to compress manual pages with '`gzip -9`' or '`bzip2 -9`' if a single compressed manual page exists in the target installation directory ('`--mandir`'). This disables automatic compression.

`--disable-public`
: Disable public release. This option is not usable on public releases and only has a usable effect on OpenSS7 ISO Stack when the package is acquired from CVS. In particular, the *STREAMS SS7/VoIP/ISDN/SIGTRAN Stacks* (`strss7-0.9a.5`) release package has a large number of non-public components. Specifying this option will cause the package to build and install all private release components in addition to the public release components. This option affects all release packages. Most release packages do not have private release components.

`--disable-initscripts`
: Disables the installation of `init` scripts. The default is to configure and install `init` scripts and their associated configuration files.

  Although the default is to install `init` scripts, installation attempts to detect a System V `init` script configuration, and if one is not found, the `init` scripts are installed into the appropriate directories, but the symbolic links to the run level script directories are not generated and the script is not invoked. Therefore, it is safe to leave this option unchanged, even on distributions that do not support System V `init` script layout (such as *NexusWare*).

`--disable-32bit-libs`
: Disables the build and install of 32-bit compatibility libraries and test binaries on 64-bit systems that support 32-bit compatibility. The default is to build and install 32-bit compatibility libraries and test binaries. This option can be usefule when configuring for an embedded target where only native shared libraries and binaries are desired.

`--disable-devel`
: Disables the installation of development environment components such as header files, static libraries, manual pages and `texinfo(1)` documentation. The default is to install development environment components. This option can be useful when configuring for an embedded target where only the runtime components are desired, or when performing a edit-compile-test cycle.

`--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(1)` or `dpkg(1)`. The '`rebuild`' `automake(1)` 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(1)` or `dpkg(1)`. The '`rebuild`' `automake(1)` target uses this feature to rebuild for all available architectures and kernels. This option has no effect for release packages that do not provide kernel modules.

`--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(1)`. The default is to configure, build and install architecture dependent package components. This option has no effect for release packages that do not provide architecture dependent components.

`--enable-indep`
: Specifies whether architecture independent package components are to be built and installed. This option can be useful when rebuilding for multiple architec-

tures and target kernels, particularly under dpkg(1). The default is to configure, build and install architecture independent package components. This options has no effect for release packages that do not provide architecture independent 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. This option has no effect for release packages that do not provide kernel modules.

`--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. This option has no effect for release packages that have are no kernel modules.

`--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 remove `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. This option has no effect for release packages that do not provide kernel modules.

`--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. This option has no effect for release packages that do not provide kernel modules.

`--disable-k-modversions`
: Disable module versions on `striso` symbols. Specifies whether kernel symbol versioning is to be used on symbols exported from built `striso` modules. The default is to provide kernel symbol versions on all exported symbols. This option has no effect for release packages that do not provide kernel modules.

`--enable-devfs`
`--disable-devfs`
: Specifies whether the build is for a device file system daemon enabled system with autoloading, or not. The default is to build for devfsd(8) autoloading when *CONFIG_DEVFS_FS* is defined in the target kernel. The '`reuild`' automake(1) target uses this option to signal to the RPM spec file that the '`dev`' subpackage need not be built. This option has no effect for release packages that do not provide devices.

`--with-gpg-user=GNUPGUSER`
: Specify the gpg(1) '`GNUPGUSER`' for signing RPMs and tarballs. The default is the content of the environment variable *GNUPGUSER*. If unspecified, the gpg(1) program will normally use the user name of the account invoking the gpg(1) 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(1) nor dpkg(1) packages, it applies to the tarball release as a whole. The default is the contents of the '`.pkgepoch`' file in the release package 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(1) nor dpkg(1) packages, it applies to the tarball release as a whole. The default is the contents of the '`.pkgrelease`' file in the release package 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(1) references. Some systems do not like grefer(1) references in manual pages.[31] This option will cook soelim(1), refer(1), tbl(1) and pic(1) commands from the manual pages and also strip groff(1) comments. The default is to leave manual pages 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 release package 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 release package 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

[31] In particular, some *Debian* or *Ubuntu* systems do not load the groff(1) extensions package and do not have grefer(1) installed. Although this is an oversight on the configuration of the particular *Debian* or *Ubuntu* system, we accomodate such misconfiguration with this feature.

release package 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 release package 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 release package 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.

`--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. The most common use of this option is to specify '`--with-k-optimize=speed --disable-k-safe`' to compile for maximum performance. Nevertheless, even these setting are *ricing* and the resulting kernel modules will only be about 5% faster.

`--with-lis[=LIS-DIR]`
`--without-lis`
: Specify the '`LIS-DIR`' directory in which to find *LiS* headers. Also specifies that the build is to be made against Linux STREAMS. The default is '`/usr/include/LiS`' if it exists, '`no`' otherwise. 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. This option has no effect on release packages that do not use the *STREAMS* subsystem.

`--with-lfs[=LFS-DIR]`
`--without-lfs`
: Specify the '`LFS-DIR`' directory in which to find *LfS* headers. Also specifies that the build is to be made against Linux Fast-STREAMS. The default is '`/usr/include/streams`' if it exists, '`no`' otherwise. 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. This option has no effect on release packages that do not use the *STREAMS* subsystem.

`--with-strconf-master=STRCONF_CONFIG`
: Specify the '`STRCONF_CONFIG`' file name to which the configuration master file is written. The default is '`Config.master`'. This option has no effect on release packages that do not use the *STREAMS* subsystem and the strconf scripts. This option should not be specified when configuring the master package as the setting for all add-on packages will conflict.

`--with-base-major=STRCONF_MAJBASE`
: Start numbering for major devices at '`STRCONF_MAJBASE`'. The default is '`230`'. This option has no effect on release packages that do not use the *STREAMS* subsystem and the strconf scripts. This option should not be specified when configuring the master package as the setting for all add-on packages will conflict.

7.2.5.2 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, `soelim(1)`. This is only necessary when the option '`--with-cooked-manpages`' has been specified and '`configure`' cannot

find the proper soelim(1) command. By default, 'configure' will search for this tool.

REFER Roff references command, refer(1). This is only necessary when the option '--with-cooked-manpages' has been specified and 'configure' cannot find the proper refer(1) command. By default, 'configure' will search for this tool.

TBL Roff table command, tbl(1). This is only necessary when the option '--with-cooked-manpages' has been specified and 'configure' cannot find the proper tbl(1) command. By default, 'configure' will search for this tool.

PIC Roff picture command, pic(1). This is only necessary when the option '--with-cooked-manpages' has been specified and 'configure' cannot find the proper pic(1) 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, gzip(1). This is only necessary when the option '--without-compressed-manpages' has *not* been specified and 'configure' cannot find the proper gzip(1) command. By default, 'configure' will search for this tool.

BZIP2 Default compression options provided to BZIP2_CMD

BZIP2_CMD
Manpages compression commands, bzip2(1). This is only necessary when the option '--without-compressed-manpages' has *not* been specified and 'configure' cannot find the proper bzip2(1) command. By default, 'configure' will search for this tool.

MAKEWHATIS
Manpages apropros database rebuild command, makewhatis(8). By default, 'configure' will search for this tool. By default, 'configure' will search for this tool.

CHKCONFIG
Chkconfig command, chkconfig(8). This was used for installation of init scripts. All packages now come with init_install(8) and init_remove(8) scripts used to install and remove init scripts on both RPM and Debian systems.

RPM Rpm command, rpm(1). This is only necessary for RPM builds. By default, 'configure' will search for this tool.

RPMBUILD
Build RPM command, rpmbuild(1). This is only necessary for RPM builds. By default, 'configure' will search for this tool. rpm(1) will be used instead of rpmbuild(1) only if rpmbuild(1) cannot be found.

DPKG Dpkg comand, dpkg(1). This command is used for building Debian packages. By default, 'configure' will search for this tool.

DPKG_SOURCE
: Dpkg-source command, `dpkg-source(1)`. This command is used for building Debian dsc packages. By default, '`configure`' will search for this tool.

DPKG_BUILDPACKAGE
: Dpkg-buildpackage command, `dpkg-buildpackage(1)`. 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 architecture.

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, `ldconfig(8)`. 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, `depmod(8)`. 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, `modprobe(8)`. 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, `lsmod(8)`. 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, `lsof(1)`. 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, `genksyms(8)`. 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, `genksyms(8)`. This is used for generating module symbol version during build. By default, '`configure`' will search for this tool.

OBJDUMP
: Object dumping command, `objdump(1)`. This is used for listing information about object files. By default, '`configure`' will search for this tool.

NM
: Object symbol listing command, `nm(1)`. This is used for listing information about object files. By default, '`configure`' will search for this tool.

MODPOST_CACHE
: Cache file for `modpost(1)`. 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, `autom4te(1)`. 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, `autom4te(1)`. This is the executable used by `autotest` for pre- and post-installation checks. By default, '`configure`' will search for this tool.

7.2.5.3 Build

To build from the tar ball, See Section 7.3.3 [Building from the Tar Ball], page 64.

7.3 Building

7.3.1 Building from the Source RPM

If you have downloaded the necessary source RPM (see Section 7.1.3 [Downloading the Source RPM], page 43), 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 7.4.1 [Installing the Binary RPM], page 67).

The source RPM is rebuilt to binary RPMs as follows:

```
% wget http://www.openss7.org/rpms/SRPMS/striso-0.9.2.1-1.src.rpm
% rpmbuild --rebuild -vv striso-0.9.2.1-1.src.rpm
```

The rebuild process can also recognize a number of options that can be used to tweak the resulting binaries, See Section 7.2.3 [Configuring the Source RPM], page 49. These options are provided on the `rpm(1)` command line. For example:

```
% rpmbuild --rebuild -vv --target athlon-redhat-linux \
  --define "_kversion 2.4.20-28.7" \
  --with lis -- striso-0.9.2.1-1.src.rpm
```

will rebuild binary RPM for the '`2.4.20-28.7`' kernel for the '`athlon`' architecture against the *LiS STREAMS* package.[32]

Installation

To install the resulting binary RPM, See Section 7.4.1 [Installing the Binary RPM], page 67.

7.3.2 Building from the Debian DSC

If you have downloaded the necessary Debian DSC (see Section 7.1.4 [Downloading the Debian DSC], page 44), 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 7.4.2 [Installing the Debian DEB], page 68).

The Debian DSC is rebuilt to binary DEBs as follows:

```
% wget http://www.openss7.org/debian/striso_0.9.2.1-0.dsc
% wget http://www.openss7.org/debian/striso_0.9.2.1-0.tar.gz
% dpkg-buildpackage -v striso_0.9.2.1-0.dsc
```

The rebuild process can also recognize a number of options that can be used to tweak the resulting binaries, See Section 7.2.4 [Configuring the Debian DSC], page 52. These options are provided in the environment variable *BUILD_DPKGOPTIONS* and have the same form as the options to '`configure`', See Section 7.2.5 [Configuring the Tar Ball], page 53. For example:

[32] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

```
% BUILD_DEBOPTIONS='
        --with-lis
        --with-k-release=2.4.20-28.7
        --host=athlon-debian-linux-gnu'
  dpkg-buildpackage -v \
  striso_0.9.2.1-0.dsc
```

will rebuild binary DEB for the '`2.4.20-28.7`' kernel for the '`athlon`' architecture against the *LiS STREAMS* package.[33]

Installation

To install the resulting binary DEB, See Section 7.4.2 [Installing the Debian DEB], page 68.

7.3.3 Building from the Tar Ball

If you have downloaded the tar ball (see Section 7.1.5 [Downloading the Tar Ball], page 44), then the following instructions will rebuild the package on your system. (Note that the build process does not required `root` privilege.)

7.3.3.1 Native Build

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

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure
% make
% popd
```

7.3.3.2 Cross-Build

Following is an example for a cross-build. The kernel release version must always be specified for a cross-build.[34] 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(1)` 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.

[33] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

[34] 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.

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure DESTDIR="/some/other/root" \
--with-k-release=2.4.18 --host sparc-linux
% make
% popd
```

7.3.3.3 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
   ```

   For more recent *NexusWare* releases, the method for rebuilding a kernel is a little different as follows:

   ```
   % pushd /u5/NexusWare80
   % ./nexus 2.4
   % ./nexus 8260
   % ./nexus quick
   % . SETUP.sh
   % popd
   ```

2. Next download, unpack (see Section 7.1.5 [Downloading the Tar Ball], page 44) and configure (see Section 7.2.5 [Configuring the Tar Ball], page 53) 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.[35]

   Any of the normal ‘`configure`’ script options (see Section 7.2.5 [Configuring the Tar Ball], page 53) 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.

   You must specify the kernel version of the kernel for which you are configuring. Add the ‘`--with-k-release=2.4.18`’ option for older *NexusWare* releases,

[35] Although I have not tried it, because we use GNU `autoconf(1)` 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.

'`--with-k-release=2.4.25`' or '`--with-k-release=2.6.12`' for more current *NexusWare* releases.

3. Install as normal (see Section 7.4.3 [Installing the Tar Ball], page 68), however, for embedded targets the '`install-strip`' `automake(1)` target should be used instead of the '`install`' `automake(1)` 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/NexusWare80
% ./nexus 2.4
% ./nexus 8260
% ./nexus quick
% . SETUP.sh
% popd
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure.nexusware --with-k-release=2.4.25 --with-k-optimize=size
% make
% make DESTDIR="$NEXUSWARE_PREFIX" 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 '*$NEXUSWARE_PREFIX*`/lib/modules/2.4.18/striso`', libraries installed in '*$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`'.

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(8)` the necessary '`striso`' modules at boot time.

NexusWare does not configure its kernels for *CONFIG_KMOD*, so any kernel modules must be loaded by the '`rc.4`' `init` script at boot. On more recent *NexusWare* releases, the `init` scripts will be installed in '*$NEXUSWARE_PREFIX*`/etc/rc.d/init.d/`' but you must manually edit your '`rc.4`' script to invoke these scripts.

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 '`striso`'. 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/striso`', 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 LiS build
#       (cd usr/src/LiS; ./configure.nexusware; $(MAKE) install-strip)
#       uncomment for LfS build
        (cd usr/src/streams; ./configure.nexusware; $(MAKE) install-strip)
#       uncomment for striso build
#       (cd usr/src/striso; ./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/striso-0.9.2.1.tar.bz2
% pushd /u5/NexusWare24
% source SETUP.sh
% pushd usr/src
% tar -xjvf ${DIRSTACK[2]}/striso-0.9.2.1.tar.bz2
% ln -sf striso-0.9.2.1 striso
% popd
% make
% popd
```

The situation is a little more complex for recent *NexusWare* releases.

7.4 Installing

7.4.1 Installing the Binary RPM

If you have downloaded the necessary binary RPMs (see Section 7.1.1 [Downloading the Binary RPM], page 37), or have rebuilt binary RPMs using the source RPM (see Section 7.3.1 [Building from the Source RPM], page 63), then the following instructions will install the RPMs on your system. For additional information on `rpm(1)`, see `rpm(8)`.

```
% pushd RPMS/i686
% rpm -ihv striso-*-0.9.2.1-1.7.2.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(1)`, see `rpm(8)`. 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' \
        -- striso-doc-0.9.2.1-1.7.2.i686.rpm
```

The previous example will install the '`striso-doc`' package by will relocate the documentation an info directory contents to the '`/usr/local`' version.

7.4.2 Installing the Debian DEB

If you have downloaded the necessary Debian DEBs (see Section 7.1.2 [Downloading the Debian DEB], page 40), or have rebuild binary DEBs using the Debian DSC (see Section 7.3.2 [Building from the Debian DSC], page 63), then the following instructions will install the DEBs on your system. For additional information see `dpkg(8)`.

```
% pushd debian
% dpkg -iv striso-*_0.9.2.1-0_*.deb
```

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

7.4.3 Installing the Tar Ball

After the build process (see Section 7.3.3 [Building from the Tar Ball], page 64), installation only requires execution of one of two `automake(1)` targets:

'`make install`'
: The '`install`' `automake(1)` target will install all the components of the package. Root privilege is required to successfully invoke this target.

'`make install-strip`'
: The '`install-strip`' `automake(1)` 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.

7.5 Removing

7.5.1 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 '^striso-'`
```

For more information see rpm(1).

7.5.2 Removing the Debian DEB

To remove and installed version of the Debian DEB (whether obtained from the OpenSS7 binary DEB releases, or whether created by the Debian DSC), execute the following command:

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

For more information see dpkg(8).

7.5.3 Removing the Source RPM

To remove all the installed binary RPM build from the source RPM, see Section 7.5.1 [Removing the Binary RPM], page 68. Then simply remove the binary RPM package files and source RPM file. A command such as:

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

should remove all 'striso' RPMs from your system.

7.5.4 Removing the Debian DSC

To remove all the installed binary DEB build from the Debian DSC, see Section 7.5.2 [Removing the Debian DEB], page 69. Then simply remove the binary DEB package files and Debian DSC file. A command such as:

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

should remove all 'striso' DEBs, DSCs and TARs from your system.

7.5.5 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' automake(1) target as follows:

```
% cd /usr/src/striso
% make uninstall
% cd ..
% rm -fr striso-0.9.2.1
% rm -f striso-0.9.2.1.tar.gz
% rm -f striso-0.9.2.1.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 7.4.3 [Installing the Tar Ball], page 68) except the final installation and then perform the steps above.

7.6 Loading

7.6.1 Normal Module Loading

When OpenSS7 ISO Stack installs, modules and drivers belonging to release packages are normally configured for demand loading. The '`install`' and '`install-strip`' automake(1) targets will make the necessary changes to the '`/etc/modules.conf`' file and place the modules in an appropriate place in '`/lib/modules/2.4.20-28.7/striso`'. The '`make install`' process should have copied the kernel module files '`streams-*.o`' to the directory '`/lib/modules/2.4.20-28.7/striso`'. This means that to load any of these modules, you can simply execute, for example, '`modprobe stream-`*`somedriver`*'.[36]

7.6.1.1 Linux Fast-STREAMS Module Loading

The '`striso`' demand load system supports both the old `kerneld` and the new `kmod` mechanisms for demand loading kernel modules.

The convention for '`striso`' kernel loadable object files is:

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

If your kernel has been built using the '`kerneld`' daemon, then '`striso`' 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.striso
if -f /lib/modules/‘uname -r‘/modules.striso
include /lib/modules/‘uname -r‘/modules.striso
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.striso`' 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.

[36] Note that the '`_kversion`' of '`2.4.20-28.7`' is only an example.

Linux Fast-STREAMS has a wider range of kernel module loading mechanisms than is provided by the deprecated *LiS*. For mechanisms used for kernel module loading under *Linux Fast-STREAMS*, See section "Top" in *Linux Fast-STREAMS Reference Manual*.

7.6.2 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.[37]

7.6.2.1 Linux STREAMS Module Loading

LiS is deprecated and this section has been deleted.

7.7 Maintenance

7.7.1 Makefile Targets

`automake(1)` has many targets, not all of which are obvious to the casual user. In addition, *OpenSS7* `automake(1)` files have additional rules added to make maintaining and releasing a package somewhat easier. This list of targets provides some help with what targets can be invoked, what they do, and what they hope to achieve. The available targets are as follows:

7.7.1.1 User Targets

The following are normal targets intended to be invoked by installers of the package. They are concerned with compiling, checking the compile, installing, checking the installation, and removing the package.

'`[all]`' This is also the default target. It compiles the package and all release packages selected by '`configure`'. This is performed after configuring the source with '`configure`'. A '`Makefile`' stub is provided so that if the package has not had `autoreconf(1)` run (such as when checked out from CVS, the package will attempt to run '`autoreconf -fiv`'.

All *OpenSS7 Project* packages are configured without maintainer mode and without dependency tracking by default. This speeds compilation of the package for one-time builds. This also means that if you are developing using the source package (edit-compile-test cycle), changes made to source files will not cause the automatic rebuilding due to dependencies. There are two ways to enable dependency tracking: specify '`--enable-maintainer-mode`' to '`configure`'; or, specify '`--enable-dependency-tracking`' to '`configure`'. I use the former during my edit-compile-test cycle.

This is a standard *GNU* `automake(1)` makefile target. This target does not require root privilege.

'`check`' All *OpenSS7 Project* release packages provide check scripts for the check target. This step is performed after compiling the package and will run all of the '`check`' programs against the compiled binaries. Which checks are performed depends on whether '`--enable-maintainer-mode`' was specified to '`configure`'. If in

[37] 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.

maintainer mode, checks that assist with the release of the package will be run (such as checking that all manual pages load properly and that they have required sections.) We recommend running the check stage before installing, because it catches problems that might keep the installed package from functioning properly.

Another way to enable the greater set of checks, without invoking maintainer mode, is to specify '`--enable-checks`' to '`configure`'. For more information, see Section 8.1.1 [Pre-installation Checks], page 81.

This is a standard *GNU* `automake(1)` makefile target, although the functions performed are customized for the *OpenSS7 Project*. This target does not require root privilege.

'`install`'
'`install-strip`'
: The '`install`' target installs the package by installing each release package. This target also performs some actions similar to the pre- and post-install scripts used by packaging tools such as `rpm(1)` or `dpkg(1)`. The '`install-strip`' target strips unnecessary symbols from executables and kernel modules before installing.

  This is a standard *GNU* `automake(1)` makefile target. This target requires root privilege.

'`installcheck`'
: All *OpenSS7 Project* packages provide test scripts for the '`installcheck`' target. Test scripts are created and run using `autotest` (part of the `autoconf(1)` package). Which test suites are run and how extensive they are depends on whether '`--enable-maintainer-mode`' was specified to '`configure`'. When in maintainer mode, all test suites will be run. When not in maintainer mode, only a few post-install checks will be performed, but the test suites themselves will be installed in '`/usr/libexec/striso`'[38] for later use.

  This is a standard *GNU* `automake(1)` makefile target. This target might require root privilege. Tests requiring root privilege will be skipped when run as a regular user. Tests requiring regular account privileges will be skipped when run as root.

'`retest`'
: To complement the '`installcheck`' target above, all *OpenSS7 Project* packages provide the '`retest`' target as a means to rerun failed conformance test suite test cases. The '`retest`' target is provided because some test cases in the test suites have delicate timing considerations that allow them to fail sporadically. Invoking this target will retest the failed cases until no cases that are not expected failures remain.

  This is an *OpenSS7 Project* specific makefile target. As with '`installcheck`', this target might require root privilege. Tests requiring root privilege will be skipped when run as a regular user. Tests requiring regular account privileges will be skipped when run as root.

[38] '`/usr/libexec/striso`' is just an example, the actual location is '`${libexecdir}/${PACKAGE}`', which varies from distribution to distribution (as some distributions such as Mandriva do not have a libexec directory).

'`uninstall`'
: This target will reverse the steps taken to install the package. This target also performs pre- and post- erase scripts used by packaging tools such as *rpm* or *dpkg*. You need to have a configured build directory from which to execute this target, however, you do not need to have compiled any of the files in that build directory.[39]

  The '`uninstall`' target unfortunately removes add-on packages in the same order in which they were installed. This is not good for the *OpenSS7 Master Package*, where the '`remove`' target should be used instead.

  This is a standard *GNU* `automake(1)` makefile target. This target requires root privilege.

'`remove`'
: This target is like '`uninstall`' with the exception that it removes add-on packages in the reverse order that installation was performed.[40]

  This is an *OpenSS7 Project* specific makefile target. This target requires root privilege.

7.7.1.2 Maintainer Targets

The following targets are targets intended for use by maintainers of the package, or those responsible for release and packaging of a derivative work of the package. Some of these targets are only effective when maintainer mode has been invoked ('`--enable-maintainer-mode`' specified to '`configure`'.)

'`dist`'
: Creates a distribution package (tarball) in the top level build directory. *OpenSS7 Project* packages distribute two archives: a '`gzip tar`' archive and a '`bzip tar`' archive. These archives will have the name '`striso-0.9.2.1.tar.gz`' and '`striso-0.9.2.1.tar.bz2`'.

  This is a standard *GNU* `automake(1)` makefile target. This target does not require root privilege.

'`distcheck`'
: This target is intended for use when releasing the package. It creates the `tar(1)` archives above and then unpacks the tarball in a source directory, configures in a separate build directory, compiles the package, installs the package in a separate install directory, tests the install package to ensure that some components work, and, finally, uses the unpacked source tree to build another tarball. If you have added or removed files from the package, this is a good way to ensure that everything is still stable for release.

  This is a standard *GNU* `automake(1)` makefile target. This target does not require root privilege.

---

[39] Therefore, it is possible to download the package, configure it, and then uninstall it. This is handy if you do not have the sources used to build and install the package immediately available.

[40] This is useful from the *OpenSS7 Master Package*.

7.7.1.3 Clean Targets

'`mostlyclean`'
: Cleans out most of the files from the compile stage. This target is helpful if you have not enabled dependency tracking and need to recompile with changes.

  This is a standard *GNU* `automake(1)` makefile target. This target does not require root privilege.

'`clean`'
: Cleans all the files from the build directory generated during the '`make [all]`' phase. It does not, however, remove files from the directory left there from the '`configure`' run. Use the '`distclean`' target to remove those too.

  This is a standard *GNU* `automake(1)` makefile target. This target might require root privilege if the '`installcheck`' target or the `testsuite` was invoked with root privilege (leaving files belonging to root).

'`distclean`'
: This target cleans out the directories left behind by '`distcheck`' and removes all the '`configure`' and generated files from the build directory. This will effectively remove all the files in the build directory, with the except of files that belong to you or some other process.

  This is a standard *GNU* `automake(1)` makefile target. This target might require root privilege if the '`installcheck`' target or the `testsuite` was invoked with root privilege (leaving files belonging to root).

'`maintainer-clean`'
: This target not only removes files from the build directory, it removes generated files from the source directory as well. Care should be taken when invoking this target, because it removes files generated by the maintainer and distributed with the archive that might require special tools to regenerate. These special tools might only be available to the maintainer.[41] It also means that you probably need a full blown Linux system to rebuild the package. For more information, see Section 7.1.6 [Downloading from CVS], page 45.

  This is a standard *GNU* `automake(1)` makefile target. This target might require root privilege if the '`installcheck`' target or the `testsuite` was invoked with root privilege (leaving files belonging to root).

'`check-clean`'
: This target removes log files left behind by the '`check`' target. By default, the check scripts append to log files in the top level build directory. This target can be used to clean out those log files before the next run.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

7.7.1.4 Release Targets

The following are targets used to generate complete releases into the package distribution directory. These are good for unattended and NFS builds, which is what I use them for.

[41] Theoretically this is true, however, the *OpenSS7 Project* does not use any maintainer programs that are not generally available (i.e. open source).

Also, when building from atop multiple packages, these targets also recurse down through each package.

'`release`' Build all of the things necessary to generate a release. On an `rpm(1)` system this is the distribution archives, the source rpm, and the architecture dependent and architecture independent binary rpms. All items are placed in the package distribution directory that can be specified with the '`--with-pkg-distdir=DIR`' option to '`configure`'.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`forced-release`'
The '`release`' target will not regenerate any files that already exist in the package distribution directory. This forced target will.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`release-sign`'
You will be prompted for a password, unless to specify it to make with the *GNUPGPASS* variable. For unattended or non-interactive builds with signing, you can do that as: '`make GNUPGPASS=mypasswd release-sign`'

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`forced-release-sign`'
The '`release-sign`' target will not regenerate any files that already exist in the package distribution directory. This forced target will.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`release-clean`'
This target will remove all distribution files for the current package from the package distribution directory.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

7.7.1.5 Logging Targets

For convenience, to log the output of a number of targets to a file, log targets are defined. The log file itself is used as the target to make, but make invokes the target minus a '`.log`' suffix. So, for example, to log the results of target '`foo`', invoke the target '`foo.log`'. The only target that this does not apply to is '`compile.log`'. When you invoke the target '`compile.log`' a simple `automake(1)` is invoked and logged to the file '`compile.log`'. The '`foo.log`' rule applies to all other targets. This does not work for all targets, just a selected few.[42] Following are the logging targets:

[42] Note that because logging targets invoke a pipe, `automake(1)` does not return the correct return status (always returns success if the `tee(1)` operation is successful). Therefore, these targets should not be invoked by scripts that need to use the return value from `automake(1)`.

Common Logging Targets

Common logging targets correspond to normal user automake(1) makefile targets as follows:

‘compile.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘[all]’.

‘check.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘check’.

‘install.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘install’.

‘installcheck.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘installcheck’.

‘uninstall.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘uninstall’.

‘remove.log’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘remove’ target.

Maintainer Logging Targets

Maintainer logging targets correspond to maintainer mode automake(1) makefile targets as follows:

‘dist.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘dist’.

‘distcheck.log’
: This is an *OpenSS7 Project* specific makefile target, but it invokes the standard *GNU* automake(1) makefile target ‘distcheck’.

‘srpm.log’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘srpm’ target.

‘rebuild.log’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘rebuild’ target.

‘resign.log’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘resign’ target.

‘release.log’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘release’ target.

‘`release-sign.log`’
: This is an *OpenSS7 Project* specific makefile target, that invokes the *OpenSS7 Project* ‘`release-sign`’ target.

If you want to add one, simply add it to *LOGGING_TARGETS* in ‘`Makefile.am`’.

7.7.1.6 Problem Report Targets

To ease problem report generation, all logging targets will automatically generate a problem report suitable for mailing in the file ‘*target*`.pr`’ for target ‘*target*`.log`’. This problem report file is in the form of an email and can be sent using the included `send-pr` script or by invoking the ‘`send-pr`’ makefile target.

There are two additional problem report targets:

‘`pr`’
: The ‘`pr`’ target is for independently generating a problem report outside of the build or installation process. The target will automatically generate a problem report skeleton suitable for editing and mailing in the file ‘`problem.pr`’. This problem report file is in the form of an email and can be edited and sent directly, or sent using the included `send-pr` script or by invoking the ‘`send-pr`’ target.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘`send-pr`’
: The ‘`send-pr`’ target is for finalizing and mailing a problem report generated either inside or outside the build and installation process. The target will automatically finalize and mail the ‘`problem.pr`’ problem report if it has changed since the last time that ‘`send-pr`’ was invoked.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege (unless the problem report file was generated as root).

7.7.1.7 Release Archive Targets

The following targets are used to generate and clean distribution archive and signature files. Whereas the ‘`dist`’ target affects archives in the top build directory, the ‘`release-archive`’ targets affects archives in the package distribution directory (either the top build directory or that specified with ‘`--with-pkg-distdir=DIR`’ to ‘`configure`’).

You can change the directory to which packages are distributed by using the ‘`--with-pkg-distdir=DIR`’ option to ‘`configure`’. The default directory is the top build directory.

‘`release-archives`’
: This target creates the distribution archive files if they have not already been created. This not only runs the ‘`dist`’ target, but also copies the files to the distribution directory, which, by default is the top build directory.

  The files generated are named:

  ‘`striso-0.9.2.1.tar.gz`’ and ‘`striso-0.9.2.1.tar.bz2`’

  You can change this distribution directory with the ‘`--with-pkg-distdir`’ option to ‘`configure`’. See ‘`./configure --help`’ for more details on options.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘release-sign-archives’
: This target is like ‘release-archives’, except that it also signs the archives using a *GPG* detached signature. You will be prompted for a password unless you pass the *GNUPGPASS* variable to make. For automated or unattended builds, pass the *GNUPGPASS* variable like so:

  ‘make GNUPGPASS=mypasswd release-sign-archives’

  Signature files will be named:

  ‘striso-0.9.2.1.tar.gz.asc’ and ‘striso-0.9.2.1.tar.bz2.asc’

  These files will be moved to the package distribution directory with the plain text archives.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘release-clean-archives’
: This target will clean the release archives and signature files from the package distribution directory.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

7.7.1.8 RPM Build Targets

On rpm(1) systems, or systems sporting rpm packaging tools, the following targets are used to generate rpm(1) release packages. The epoch and release number can be controlled by the contents of the ‘.rpmepoch’ and ‘.rpmrelease’ files, or with the ‘--with-rpm-epoch=EPOCH’ and ‘--with-rpm-release=RELEASE’ options to ‘configure’. See ‘configure --help’ for more information on options. We always use release number ‘1’. You can use release numbers above ‘1’.

‘srpm’
: This target generates the source rpm for the package (without signing the source rpm). The source rpm will be named: ‘striso-0.9.2.1-1.srpm’.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘rpms’
: This target is responsible for generating all of the package binary rpms for the architecture. The binary rpms will be named:

  ‘striso-*-0.9.2.1-1.*.rpm’

  where the stars indicate the subpackage and the architecture. Both the architecture specific subpackages (binary objects) and the architecture independent (‘.noarch’) subpackages will be built unless the the former was disabled with the option ‘--disable-arch’, or the later with the option ‘--disable-indep’, passed to ‘configure’.

  This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘sign’
‘srpm-sign’
: These two targets are the same. When invoked, they will add a signature to the source rpm file, provided that the file does not already have a signature.

You will be prompted for a password if a signature is required. Automated or unattended builds can be achieved by using the `emake` expect script, included in '`${srcdir}/scripts/emake`'.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`rebuild`' This target accepts searches out a list of kernel names from the '`${DESTDIR}/lib/modules`' directory and builds rpms for those kernels and for each of a set of architectures given in the *AM_RPMTARGETS* variable to make. This is convenience target for building a group of rpms on a given build machine.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`resign`' This target will search out and sign, with a *GPG* signature, the source rpm, and all of the binary rpms for this package that can be found in the package distribution directory. This target will prompt for a *GPG* password. Automated or unattended builds can be achieved with the `emake` expect script located here: '`${srcdir}/scripts/emake`'.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

7.7.1.9 Debian Build Targets

On Debian systems, or systems sporting Debian packaging tools, the following targets are used to generate Debian release packages. The release number can be controlled by the contents of the '`.debrelease`' file, or with the '`--with-debrelease=RELEASENUMBER`' option to '`configure`'. See '`configure --help`' for more information on options.

'`dsc`' This target will build the Debian source change package ('`.dsc`' file). We use release number '`0`' so that the entire tarball is included in the '`dsc`' file. You can use release number '`1`' for the same purposes. Release numbers above '`1`' will not include the entire tarball. The '`.dsc`' file will be named: '`striso_0.9.2.1-0.dsc`'.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`sigs`' This target signs the '`.deb`' files. You will be prompted for a password, unless to specify it to make with the *GNUPGPASS* variable.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

'`debs`' This target will build the Debian binary package ('`.deb`' file) from the '`.dsc`' created above. (This target will also create the '`.dsc`' if it has not been created already.) The subpackage '`.deb`' files will be named: '`striso-*_0.9.2.1-0_*.deb`', where the stars indicate the subpackage and the architecture.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

‘`csig`’ This target signs the ‘`.dsc`’ file. You will be prompted for a password, unless to specify it to make with the *GNUPGPASS* variable.

This is an *OpenSS7 Project* specific makefile target. This target does not require root privilege.

8 Troubleshooting

8.1 Test Suites

8.1.1 Pre-installation Checks

Most *OpenSS7* packages, including the *OpenSS7 ISO Stack* package, ship with pre-installation checks integral to the build system. Pre-installation checks include check scripts that are shipped in the '`scripts`' subdirectory as well as specialized `make` targets that perform the checks.

When building and installing the package from *RPM* or *DEB* source packages (see Section 7.3.1 [Building from the Source RPM], page 63; and Section 7.3.2 [Building from the Debian DSC], page 63), a fundamental set of post-compile, pre-installation checks are performed prior to building binary packages. This is performed automatically and does not require any special actions on the part of the user creating binary packages from source packages.

When building and installing the package from *tarball* (see Section 7.3.3 [Building from the Tar Ball], page 64; and Section 7.4.3 [Installing the Tar Ball], page 68), however, pre-installation checks are only performed if specifically invoked by the builder of the package. Pre-installation checks are invoked after building the package and before installing the package. Pre-installation checks are performed by invoking the '`check`' or '`check.log`' target to `make` when building the package, as shown in Example 8.1.

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure
% make
% make check  # <------- invoke pre-installation checks
% popd
```

Example 8.1: *Invoking Pre-Installation Checks*

Pre-installation checks fall into two categories: *System Checks* and *Maintenance Checks*.

8.1.1.1 Pre-Installation System Checks

System Checks are post-compilation checks that can be performed before installing the package that check to ensure that the compiled objects function and will be successfully installed. When the '`--enable-maintainer-mode`' option has not been passed to `configure`, only *System Checks* will be performed.

For example, the steps shown in Example 8.2 will perform *System* checks.

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure
% make
% make check  # <------ invokes System pre-installation checks
% popd
```

Example 8.2: *Invoking System Checks*

8.1.1.2 Pre-Installation Maintenance Checks

Maintenance Checks include all *System Checks*, but also checks to ensure that the kernel modules, applications programs, header files, development tools, test programs, documentation, and manual pages conform to *OpenSS7* standards. When the '`--enable-maintainer-mode`' option has been passed to `configure`, *Maintenance Checks* will be performed.

For example, the steps shown in Example 8.3 will perform *Maintenance* checks.

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure --enable-maintainer-mode
% make
% make check  # <------ invokes Maintenance pre-installation checks
% popd
```

Example 8.3: *Invoking Maintenance Checks*

8.1.1.3 Specific Pre-Installation Checks

A number of check scripts are provided in the '`scripts`' subdirectory of the distribution that perform both *System* and *Maintenance* checks. These are as follows:

`check_commands`

This check performs both *System* and *Maintenance* checks.

When performing *System* tests, the following tests are performed:

Unless cross-compiling, or unless a program is included in `AM_INSTALLCHECK_STD_OPTIONS_EXEMPT` every program in `bin_PROGRAMS`, `sbin_PROGRAMS`, and `libexec_PROGRAMS` is tested to ensure that the '`--help`', '`--version`', and '`--copying`' options are accepted. When cross-compiling is is not possible to execute cross-compiled binaries, and these checks are skipped in that case.

Script executables, on the other hand, can be executed on the build host, so, unless listed in `AM_INSTALLCHECK_STD_OPTIONS_EXEMPT`, every program in `dist_bit_SCRIPTS`, `dist_sbin_SCRIPTS`, and `pkglibexec_SCRIPTS` are tested to ensure that the '`--help`', '`--version`', and '`--copying`' options are accepted.

When performing *Maintenance* tests, `check_commands` also checks to ensure that a manual page exists in section 1 for every executable binary or script

that will be installed from `bin_PROGRAMS` and `dist_bin_SCRIPTS`. It also checks to ensure that a manual page exists in section 8 for every executable binary or script that will be installed from `sbin_PROGRAMS`, `dist_sbin_SCRIPTS`, `libexec_PROGRAMS`, and `pkglibexec_SCRIPTS`.

`check_decls`

This check only performs *Maintenance* checks.

It collects the results from the `check_libs`, `check_modules` and `check_headers` check scripts and tests to ensure every declaration of a function prototype or external variable contained in installed header files has a corresponding exported symbol from either a to be installed shared object library or a to be installed kernel module. Declarations are exempted from this requirement if their identifiers have been explicitly added to the `EXPOSED_SYMBOL` variable. If `WARN_EXCESS` is set to '`yes`', then the check script will only warn when excess declarations exist (without a corresponding exported symbol); otherwise, the check script will generate an error and the check will fail.

`check_headers`

This check only performs *Maintenance* checks.

When performing *Maintenance* tests, it identifies all of the declarations included in to be installed header files. It then checks to ensure that a manual page exists in sections 2, 3, 7 or 9, as appropriate, for the type of declaration. It also checks to see if a manual page source file exists in the source directory for a declaration that has not been included in the distribution. Function or prototype declarations that do not have a manual page in sections 2, 3, or 9 will cause the check to fail. Other declarations ('`variable`', '`externvar`', '`macro`', '`enumerate`', '`enum`', '`struct`', '`union`', '`typedef`', '`member`', etc.) will only warn if a manual page does not exist, but will not fail the check.

`check_libs`

This check only performs *Maintenance* checks.

When performing *Maintenance* tests, it checks that each exported symbol in each to be installed shared object library has a manual page in section 3. It also checks that each exported symbol has a '`function`', '`prototype`' or '`externvar`' declaration in the to be installed header files. A missing declaration or manual page will cause this check to fail.

`check_mans`

This check only performs *Maintenance* checks.

When performing *Maintenance* tests, it checks that to be install manual pages can be formatted for display without any errors or warnings from the build host `man` program. It also checks that required headings exist for manual pages according to the section in which the manual page will be installed. It warns if recommended headings are not included in the manual pages. Because some *RPM* distributions have manual pages that might conflict with the package manual pages, this check script also checks for conflicts with installed manual pages on the build host. This check script also checks to ensure that all to be

installed manual pages are used in some fashion, that is, they have a declaration, or exported symbol, or are the name of a kernel module or STREAMS module or driver, possibly capitalized.

Note that checking for conflicts with the build host should probably be included in the *System* checks (because *System* checks are performed before the source *RPM* `%install` scriptlet).

`check_modules`

This check performs both *System* and *Maintenance* checks.

When performing *System* tests, it checks each to be installed kernel module to ensure that all undefined symbols can be resolved to either the kernel or another module. It also checks whether an exported or externally declared symbol conflicts with an exported or externally declared symbol present in the kernel or another module.[1]

When performing *Maintenance* tests, this check script tests that each to be installed kernel module has a manual page in section 9 and that each exported symbol that does not begin with an underscore, and that belongs to an exported function or exported variable, has a manual page in section 9. It also checks to ensure that each exported symbol that does not begin with an underscore, and that belongs to an exported function or exported variable, has a '`function`', '`prototype`' or '`externvar`' declaration in the to be installed header files.

`check_streams`

This check performs only *Maintenance* checks.

When performing *Maintenance* tests, it checks that for each configured *STREAMS* module or driver, or device node, that a manual page exists in section 4 or section 7 as appropriate.

The output of the pre-installation tests are fairly self explanatory. Each check script saves some output to '*`name`*`.log`', where *name* is the name of the check script as listed above. A summary of the results of the test are display to standard output and can also be captured to the '`check.log`' file if the '`check.log`' target is used instead of the '`check`' target to `make`.

Because the check scripts proliferate '*`name`*`.log`' files throughout the build directory, a '`make check-clean`' `make` target has be provided to clean them out. '`make check-clean`' should be run before each successive run of '`make check`'.

8.1.2 Post-installation Checks

Most OpenSS7 packages ship with a compatibility and conformance test suite built using the '`autotest`' capabilities of '`autoconf 2.59`'. These test suites act as a wrapper for the compatibility and conformance test programs that are shipped with the package.

Unlike the pre-installation checks, the post-installation checks are always run complete. The only check that post-installation test scripts perform is to test whether they have been invoked with root privileges or not. When invoked as root, or as a plain user, some tests might be skipped that require root privileges, or that require plain user privileges, to complete successfully.

[1] This particular check has caught some name space pollution that has occurred in the 2.6.11 kernel.

8.1.2.1 Running Test Suites

There are several ways of invoking the conformance test suites:

1. The test suites can be run after installation of the package by invoking the '`make installcheck`' or '`make installcheck.log`' target. Some packages require that root privileges be acquired before invoking the package.
2. The test suites can be run from the distribution subdirectory after installation of the package by invoking the `testsuite` shell script directly.
3. The test suites can be run standalone from the '`libexec`' ('`/usr/libexec`') installation directory by invoking the `testsuite` shell script directly.

Typical steps for invoking the test suites directly from `make` are shown in Example 8.4.

```
% wget http://www.openss7.org/striso-0.9.2.1.tar.bz2
% tar -xjvf striso-0.9.2.1.tar.bz2
% pushd striso-0.9.2.1
% ./configure
% make
% make check  # <------ invokes System pre-installation checks
% make install
% sudo make installcheck # <------- invokes post-installation tests
% popd
```

Example 8.4: *Invoking System Checks*

When performing post-installation checks for the purposes of generating a problem report, the checks should always be performed from the build directory, either with '`make installcheck`' or by invoking `testsuite` directly from the '`tests`' subdirectory of the build directory. This ensures that all of the information known to `configure` and pertinent to the configuration of the system for which a test case failed, will be collected in the resulting '`testsuite.log`' file deposited upon test suite failure in the '`tests`' directory. This '`testsuite.log`' file can then be attached as part of the problem report and provides rich details to maintainers of the package. See also See Section 8.2 [Problem Reports], page 85, below.

Typical steps for invoking and installed `testsuite` standalone are shown in Example 8.5.

```
% [sudo] /usr/libexec/striso/testsuite
```

Example 8.5: *Invoking* `testsuite` *Directly*

When invoked directly, `testsuite` will generate a '`testsuite.log`' file in the current directory, and a '`testsuite.dir`' directory of failed tests cases and debugging scripts. For generating a problem report for failed test cases, see Section 8.2.4 [Stand Alone Problem Reports], page 88.

8.2 Problem Reports

8.2.1 Problem Report Guidelines

Problem reports in the following categories should include a log file as indicated in the table below:

‘`./configure`’
: A problem with the configuration process occurs that causes the ‘`./configure`’ command to fail. The problem report must include the ‘`config.log`’ file that was generated by `configure`.

‘`make compile.log`’
: A problem with the build process occurs that causes the ‘`make`’ command to fail. Perform ‘`make clean`’ and then ‘`make compile.log`’ and attach the ‘`config.log`’ and ‘`compile.log`’ files to the problem report.

‘`make check.log`’
: A problem occurs with the ‘`make check`’ target that causes it to fail. Perform ‘`make check-clean check.log`’ and attach the ‘`config.log`’, ‘`compile.log`’ and ‘`check.log`’ files to the problem report.

‘`sudo make install.log`’
: A problem occurs with ‘`sudo make install`’ that causes it to fail. Perform ‘`sudo make uninstall`’ and ‘`sudo make install.log`’ and attach the ‘`config.log`’, ‘`compile.log`’, ‘`check.log`’, and ‘`install.log`’ files to the problem report.

‘`[sudo] make installcheck.log`’
: A problem occurs with the ‘`make installcheck`’ target that causes the test suite to fail. Attach the resulting ‘`tests/testsuite.log`’ and ‘`installcheck.log`’ file to the problem report. There is no need to attach the other files as they are included in ‘`tests/testsuite.log`’.

‘`[sudo] make uninstall.log`’
: A problem occurs with the ‘`make uninstall`’ target that causes the test suite to fail. Perform ‘`sudo make uninstall.log`’ and attach the ‘`config.log`’, ‘`compile.log`’, ‘`check.log`’, ‘`install.log`’, ‘`installcheck.log`’, ‘`tests/testsuite.log`’ and ‘`uninstall.log`’ file to the problem report.

‘`[sudo] make remove.log`’
: A problem occurs with the ‘`make remove`’ target that causes the test suite to fail. Perform ‘`sudo make remove.log`’ and attach the ‘`config.log`’, ‘`compile.log`’, ‘`check.log`’, ‘`install.log`’, ‘`installcheck.log`’, ‘`tests/testsuite.log`’ and ‘`remove.log`’ file to the problem report.

For other problems that occur during the use of the *OpenSS7 ISO Stack* package, please write a test case for the test suite that recreates the problem if one does not yet exist and provide a test program patch with the problem report. Also include whatever log files are generated by the kernel (`cmn_err(9)`) or by the `strerr(8)` or `strace(1)` facilities (`strlog(9)`).

8.2.2 Generating Problem Reports

The OpenSS7 Project uses the *GNU GNATS* system for problem reporting. Although the ‘`send-pr`’ tool from the *GNU GNATS* package can be used for bug reporting to the project’s

GNATS database using electronic mail, it is not always convenient to download and install the *GNATS* system to gain access to the '`send-pr`' tool.

Therefore, the *OpenSS7 ISO Stack* package provides the '`send-pr`' shell script that can be used for problem reporting. The '`send-pr`' shell script can invoked directly and is a work-alike for the *GNU* '`send-pr`' tool.

The '`send-pr`' tool takes the same flags and can be used in the same fashion, however, whereas '`send-pr`' is an interactive tool[2], '`send-pr`' is also able to perform batch processing. Whereas '`send-pr`' takes its field information from local databases or from using the '`query-pr`' C-language program to query a remote database, the '`send-pr`' tool has the field database internal to the tool.

Problem reports can be generate using `make`, See Section 7.7.1.6 [Problem Report Targets], page 77. An example of how simple it is to generate a problem report is illustrated in Example 8.6.

```
% make pr
SEND-PR:
SEND-PR: send-pr:  send-pr was invoked to generate an external report.  An
SEND-PR: automated problem report has been created in the file named
SEND-PR: 'problem.pr' in the current directory.  This problem report can
SEND-PR: be sent to bugs@openss7.org by calling this script as
SEND-PR: '/home/brian/os7/scripts/send-pr --file="problem.pr"'.
SEND-PR:
SEND-PR: It is possible to edit some of the fields before sending on the
SEND-PR: problem report.  Please remember that there is NO WARRANTY.  See
SEND-PR: the file 'COPYING' in the top level directory.
SEND-PR:
SEND-PR: Please do not send confidential information to the bug report
SEND-PR: address.  Inspect the file 'problem.pr' for confidential
SEND-PR: information before mailing.
SEND-PR:
% vim problem.pr  # <--- follow instructions at head of file
% make send-pr
```

Example 8.6: *Invoking Problem Report Generation*

Using the '`make pr`' target to generate a problem report has the advantages that it will assemble any available '`*.log`' files in the build directory and attach them to the problem report.

8.2.3 Automatic Problem Reports

The *OpenSS7 ISO Stack* package also provides a feature for automatic problem report generation that meets the problem report submission guidelines detailed in the preceding sections.

Whenever a logging makefile target (see Section 7.7.1.5 [Logging Targets], page 75) is invoked, if the primary target fails, the `send-pr` shell script is invoked to automatically

[2] '`send-pr`' launches the user's *EDITOR* to edit the problem report before submitting it.

generate a problem report file suitable for the corresponding target (as described above under see Section 8.2.1 [Problem Report Guidelines], page 86). An example is shown in Example 8.8.

```
% make compile.log
...
...
make[5]: *** [libXNSdrvs_a-ip.o] Error 1
make[5]: Leaving directory `/u6/buildel4/strxns'
make[4]: *** [all-recursive] Error 1
make[4]: Leaving directory `/u6/buildel4/strxns'
make[3]: *** [all] Error 2
make[3]: Leaving directory `/u6/buildel4/strxns'
make[2]: *** [all-recursive] Error 1
make[2]: Leaving directory `/u6/buildel4'
make[1]: *** [all] Error 2
make[1]: Leaving directory `/u6/buildel4'
SEND-PR:
SEND-PR: send-pr:  Make target compile.log failed in the compile stage.  An
SEND-PR: automated problem report has been created in the file named
SEND-PR: 'problem.pr' in the current directory.  This problem report can
SEND-PR: be sent to bugs@openss7.org by calling 'make send-pr'.
SEND-PR:
SEND-PR: It is possible to edit some of the fields before sending on the
SEND-PR: problem report.  Please remember that there is NO WARRANTY.  See
SEND-PR: the file 'COPYING' in the top level directory.
SEND-PR:
SEND-PR: Please do not send confidential information to the bug report
SEND-PR: address.  Inspect the file 'problem.pr' for confidential
SEND-PR: information before mailing.
SEND-PR:
% vim problem.pr  # <--- follow instructions at head of file
% make send-pr
```

Example 8.7: *Problem Report from Failed Logging Target*

8.2.4 Stand Alone Problem Reports

The *OpenSS7 ISO Stack* package installs the `send-pr` script and its configuration file '`send-pr.config`' in '`${libexecdir}/striso`' along with the validation `testsuite`, see See Section 8.1 [Test Suites], page 81. As with the `testsuite`, this allows the `send-pr` script to be used for problem report generation on an installed system that does not have a build directory.

An example of invoking the package `testsuite` and then generating a problem report for failed cases is shown in Example 8.8.

```
% [sudo] /usr/libexec/striso/testsuite
% # test cases failed...
% /usr/libexec/striso/send-pr
SEND-PR:
SEND-PR: send-pr:  send-pr was invoked to generate an external report.  An
SEND-PR: automated problem report has been created in the file named
SEND-PR: 'problem.pr' in the current directory.  This problem report can
SEND-PR: be sent to bugs@openss7.org by calling this script as
SEND-PR: '/usr/libexec/striso/send-pr --file problem.pr'.
SEND-PR:
SEND-PR: It is possible to edit some of the fields before sending on the
SEND-PR: problem report.  Please remember that there is NO WARRANTY.  See
SEND-PR: the file 'COPYING' in the top level directory.
SEND-PR:
SEND-PR: Please do not send confidential information to the bug report
SEND-PR: address.  Inspect the file 'problem.pr' for confidential
SEND-PR: information before mailing.
SEND-PR:
% vim problem.pr  # <--- follow instructions at head of file
% /usr/libexec/striso/send-pr --file problem.pr
```

Example 8.8: *Invoking* `send-pr` *Directly*

The advantage of the approach shown in the example is that the `send-pr` script is capable of collecting the '`testsuite.log`' file and the failed test cases and debugging scripts from the '`testsuite.dir`' directory and including them in the problem report, as well as all package pertinent information from the installed '`send-pr.config`'.

8.3 Known Problems

The OpenSS7 Project does not ship software with known bugs. All bugs are unknown.

Verified behaviour is that behaviour that has been verified by conformance test suites that are shipped with the *OpenSS7 ISO Stack* package.

Unverified behaviour may contain unknown bugs.

Please remember that there is **NO WARRANTY**.

See also Section 6.5 [Bugs], page 34, or file '`BUGS`' in the release directory.

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```
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```

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