



Amateur Radio Software Distributed with (X)Ubuntu LTS

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Introduction

Amateur radio (also called “ham radio”), is a technical hobby. Many ham radio stations are highly integrated with computers. Radios are interfaced with computers to aid with contact logging, propagation prediction, station spotting, antenna steering, signal (de)modulation and filtering.

For many years, amateur radio software has been a bastion of Windows™ applications developed by Microsoft. However, with the advent of the [Raspberry Pi](#), amateur radio hobbyists are slowly but surely discovering GNU/Linux.

Most of the software for GNU/Linux is available through package repositories. Such package repositories come by default with the GNU/Linux distribution of your choice. Package management systems offer many benefits in the form of security (you know what you are getting from whom) and ease-of-use (packages are upgraded automatically). No longer does one need to wander the back corners of the internet to find new or updated software, exposing oneself to the risk of catching a computer virus.

A number of GNU/Linux distributions offer freely installable ham-related packages under the “Amateur Radio” section of their main repository. The largest collection of ham radio packages is offered by [OpenSuse](#) and [Debian](#)-derived distributions like [Xubuntu LTS](#) and [Linux Mint](#), to name but a few. [Arch Linux](#) may also have whole bunch of ham related software in the [Arch User Repository \(AUR\)](#).

Synaptic

One way to find and install ham radio packages on Debian-derived distros is by using the **Synaptic graphical package manager** (see Figure 1). However, searching the vast Synaptic package database may become **rapidly overwhelming** at times. This is why for this article, another technique was employed; namely, shamelessly exploiting aptitude command-line arguments.

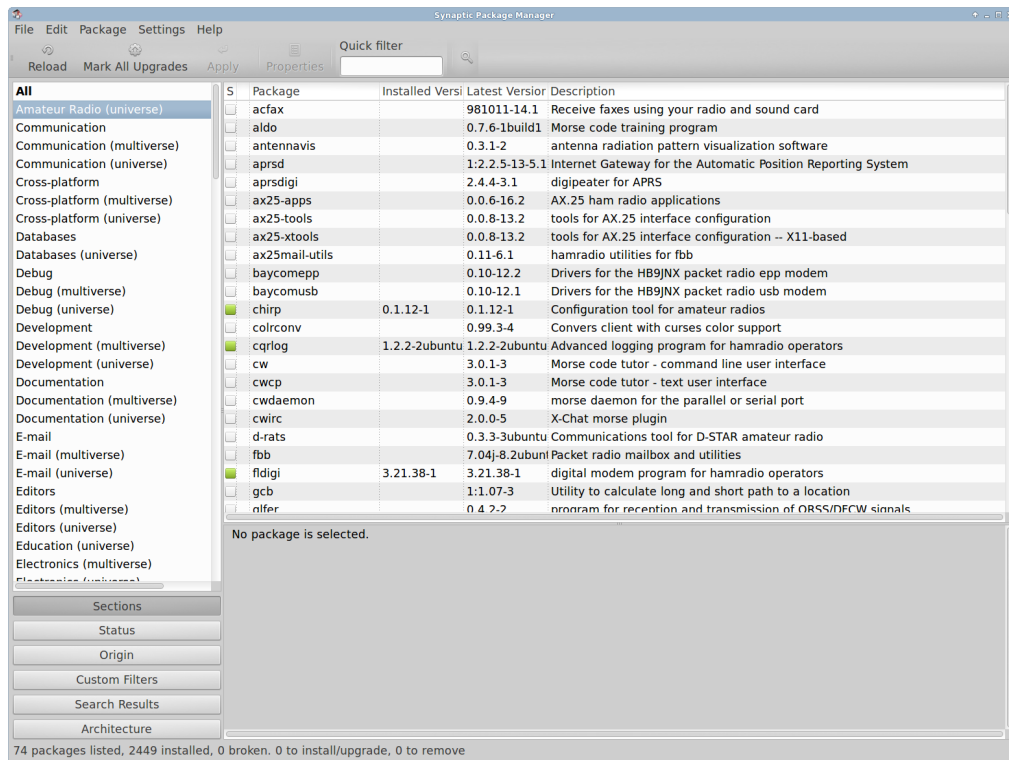


Figure 1: The **Synaptic graphical package manager** partially showing the “Amateur Radio” section of the **Xubuntu LTS** repository.

Hamradio

The entire default ham radio package list is printed below. Lazy as I am, the [Markdown table](#) was [created from the command line](#) and included by reference into the surprisingly short [Markdown source of this page](#). Below command prints a [Markdown pipe table](#) with the package name and description of all packages belonging to the hamradio section of the native architecture. If you want to find out more about how this works, here are aptitude's [package list customisation escape codes](#) and [search patterns](#).

```
$ aptitude -F'%p' search '~r native ~s hamradio' \
|xargs apt-cache show \
|awk '/^Package/{name=$2} \
/^Description-en/{$1="";sub(FS,"");description=$0} \
/^Homepage/{url=$2} \
/^$/{{if(url) {printf("|["name"]("url")|"description"|\n");
url=""} \
else {printf("|"name|"description"|\n)}}}' \
|sed -e '/.*-common/d' -e '/.*-core/d' \
-e '/.*-data/d' -e '/.*-dev/d' -e '/.*-doc.*d' \
-e '/^|lib.*d' -e '/^|\[lib.*d' \
|sort -u \
> ../doc/hamradio.tmp
```

Table 1: Amateur radio packages distributed with Xubuntu LTS

name	package description
acfax	Receive faxes using your radio and sound card
aldo	Morse code training program
ampr-ripd	Routing daemon for AMPRnet gateway announcements
antennavis	antenna radiation pattern visualization software
aprsdigi	digipeater for APRS
aprx	APRS Digipeater and iGate
ax25-apps	AX.25 ham radio applications
ax25mail-utils	hamradio packet utilities for fbb
ax25-tools	tools for AX.25 interface configuration
ax25-xtools	tools for AX.25 interface configuration – X11-based
axmail	Mail user agent for ax.25 users, accessed via a node frontend
baycomepp	Drivers for the HB9JNX packet radio epp modem
baycomusb	Drivers for the HB9JNX packet radio usb modem
comptext	Gui based tool to compare two text streams
comptty	GUI based tool to compare two RTTY streams
cqrlog	Advanced logging program for hamradio operators
cubicsdr	Software Defined Radio receiver
cutesdr	simple demodulation and spectrum display program
cwcp	Morse code tutor - text user interface
cwdaemon	morse daemon for the parallel or serial port
cw	Morse code tutor - command line user interface
dablin	CLI and GTK+ GUI DAB & DAB+ receiver client
direwolf	Soundcard TNC for APRS
dmrconfig	Configuration utility for DMR radios
ebook2cwgui	GUI for ebook2cw
ebook2cw	convert ebooks to Morse MP3s/OGGs
fbb	Packet radio mailbox and utilities
fccexam	Study tool for USA FCC commercial radio license exams.
flamp	ham radio Amateur Multicast Protocol application
fldigi	digital modem program for hamradio operators
flmsg	amateur radio forms management editor
flrig	ham radio transceiver control program
flwrap	amateur radio file encapsulation/compression utility
freedv	Software Defined Radio (SDR)
glfer	program for reception and transmission of QRSS/DFCW signals
gnss-sdr	Global navigation satellite systems software defined receiver
gnuaisgui	OpenStreetMap GUI for gnuais
gnuais	AIS receiver which uses the discriminator output of VHF receivers
gpredict	Satellite tracking program
gqrx-sdr	Software defined radio receiver

name	package description
gr-dab	Gnuradio blocks and tools for receiving DAB and DAB+ radio
grig	graphical user interface to the Ham Radio Control Libraries
gsmc	Smith Chart calculator for impedance matching
hacktv	Analogue TV transmitter for the HackRF
hamexam	Study tool for USA FCC amateur radio (ham) exams.
hamradio-files	Ham radio call sign and prefix lists
icom	Software control for ICOM radios with CI-V interface
inspectrum	tool for visualising captured radio signals
js8call	Amateur Radio Digital Mode providing weak signal messaging
klog	Multiplatform ham radio logging program
limesuite	tools to test, control and update LMS7 transceiver based hardware
linpac	terminal for packet radio with mail client
linpsk	program for operating PSK31/RTTY modes with X GUI
morse2ascii	tool for decoding the morse codes from a PCM WAV file
morse	training program about morse-code for aspiring radio hams
morse-x	morse "practicing" tool for X
multimon	Linux Radio Transmission Decoder
multimon-ng	digital radio transmission decoder
nec2c	Translation of the NEC2 FORTRAN source code to the C language
owx	utility to program Wouxun dual-band handheld radios
p10cfd	Remote configuration daemon for Gracilis Packeten
psk31x	PSK31 terminal application with text-based user interface
pyqso	logging tool for amateur radio operators
qrq	high speed morse trainer, similar to DL4MM's Rufz
qsstv	Qt-based slow-scan TV and fax
qtel	Graphical client for the EchoLink® protocol
qtel-icons	Icons for graphical client for the EchoLink® protocol
quisk	Software Defined Radio (SDR)
remotetrx	Remote controller for radio transceivers
rtl-433	Decode 433.9 Mhz data
soapyremote-server	Use SoapySDR devices over network (server)
soapysdr0.7-module-airspy	Airspy device support for SoapySDR
soapysdr0.7-module-all	All device support for SoapySDR (metapackage)
soapysdr0.7-module-audio	Audio device support for SoapySDR
soapysdr0.7-module-bladerf	bladeRF device support for SoapySDR
soapysdr0.7-module-hackrf	HackRF device support for SoapySDR
soapysdr0.7-module-lms7	Lime Microsystems LMS7 device support for SoapySDR

name	package description
soapysdr0.7-module-mirisdr	Mirics SDR device support for SoapySDR
soapysdr0.7-module-osmosdr	OsmoSDR device support for SoapySDR
soapysdr0.7-module-redpitaya	RedPitaya device support for SoapySDR
soapysdr0.7-module-remote	Use SoapySDR devices over network (client module)
soapysdr0.7-module-rfspace	RFSpace device support for SoapySDR
soapysdr0.7-module-rtlsdr	RTL-SDR device support for SoapySDR
soapysdr0.7-module-uhd	UHD device support for SoapySDR
soapysdr-module-airspy	Airspy device support for SoapySDR (default version)
soapysdr-module-all	All device support for default version of SoapySDR (metapackage)
soapysdr-module-audio	Audio device support for SoapySDR (default version)
soapysdr-module-bladerf	bladeRF device support for SoapySDR (default version)
soapysdr-module-hackrf	HackRF device support for SoapySDR (default version)
soapysdr-module-lms7	Lime Microsystems LMS7 device support for SoapySDR (default version)
soapysdr-module-mirisdr	Mirics SDR device support for SoapySDR (default version)
soapysdr-module-osmosdr	OsmoSDR device support for SoapySDR (default version)
soapysdr-module-redpitaya	RedPitaya device support for SoapySDR (default version)
soapysdr-module-remote	Use SoapySDR devices over network (default client module)
soapysdr-module-rfspace	RFSpace device support for SoapySDR (default version)
soapysdr-module-rtlsdr	RTL-SDR device support for SoapySDR (default version)
soapysdr-module-uhd	UHD device support for SoapySDR (default version)
soapysdr-tools	software defined radio interface library tools
soundmodem	Sound Card Amateur Packet Radio Modems
splat	analyze point-to-point terrestrial RF communication links
svxlink-calibration-tools	Calibration tools for SvxLink amateur radio suite
svxlink-gpio	GPIO control scripts SvxLink amateur radio server
svxlink-server	Voice-over-IP server for ham radio operators
svxreflector	Conference server for SvxLink amateur radio servers
tk2	Tk GUI for the ICOM IC-R2 receiver
tk5	Experimental Software for the ICOM IC-R5 Receiver
tlf	console based ham radio contest logger
trustedqsl	QSL log signing for the Logbook of the World (LoTW)
tucnak	VHF/UHF/SHF Hamradio contest logging program
twclock	World clock for ham radio operators
twpsk	Soundcard-based X program for operating PSK31
uhd-soapysdr	SoapySDR device support for libuhd
uronode	Node front end for AX.25, NET/ROM, Rose and TCP

name	package description
welle.io	DAB/DAB+ Software Radio
wsjtx	Weak-signal amateur radio communications
wwl	Calculates distance and azimuth between two Maidenhead locators
xastir	X Amateur Station Tracking and Information Reporting
xcwcp	Morse code tutor - graphical user interface
xdemorse	decode Morse signals to text
xdx	DX-cluster tcp/ip client for amateur radio
xlog	GTK+ Logging program for Hamradio Operators
xnec2c	calculate and display radio antenna properties
xnecview	NEC structure and gain pattern viewer
yagiuda	software to analyse performance of Yagi-Uda antennas
z8530-utils2	Utilities for Z8530 based HDLC cards for AX.25

Electronics

But wait, there is more! ... The vast array of electronics packages should not be overlooked.

```
$ ( aptitude -F'%p' search '~r native ~s electronics'
  aptitude -F'%p' search '~r native ~Rrecommends: science-electronics'
  aptitude -F'%p' search '~r native ~Rsuggests: science-electronics' ) \
|xargs apt-cache show \
|awk '/^Package/{name=$2} \
/^Description-en/{$1="";sub(FS,"");description=$0} \
/^Homepage/{url=$2} \
/^$/{{if(url) {printf("|["name"]("url")|description"|\n");
url=""} \
      else {printf("|"name|"description"|\n)}}}' \
|sed -e '/.*-common/d' -e '/.*-core/d' \
     -e '/.*-data/d' -e '/.*-dev/d' -e '/.*-doc.*d' \
     -e '/^|lib.*d' -e '/^|\[lib.*d' \
|sort -u \
> ../doc/electronics.tmp
```


Table 2: Electronics packages distributed with Xubuntu LTS

name	package description
altos	Altus Metrum firmware and utilities
arachne-pnr-chipdb	Chip db files for arachne-pnr
arachne-pnr	Place and route tool for iCE40 family FPGAs
arduino-builder	Command line tool for compiling Arduino sketches
arduino	AVR development board IDE and built-in libraries
arduino-mighty-1284p	Platform files for Arduino to run on ATmega1284P
arduino-mk	Program your Arduino from the command line
atlc	Arbitrary Transmission Line Calculator
atlc-examples	Examples for Arbitrary Transmission Line Calculator
avarice	use GDB with Atmel AVR debuggers
avra	assembler for Atmel AVR microcontrollers
avrdude	software for programming Atmel AVR microcontrollers
avrp	Programmer for Atmel AVR microcontrollers
berkeley-abc	ABC - A System for Sequential Synthesis and Verification
bossa-cli	Atmel SAM ARM microcontroller flash programming utility
bossa	Atmel SAM ARM microcontroller flash programming GUI
bottlerocket	Utility to control X10 Firecracker devices for home automation
caneda	Electronic Design Automation software focused on easy of use and portability
canmatrix-utils	Handle CAN (Controller Area Network) descriptions - cmdline utilities
circuit-macros	Macros for drawing electric circuits
ckb-next	driver for Corsair keyboards and mice
covered	Verilog code coverage analysis tool
cycfx2prog	Cypress EZ-USB FX2 (LP) programmer
dfcgen-gtk	Digital Filter Coefficients Generator (DFCGen) GTK+
dfu-util	Device firmware update (DFU) USB programmer
digitemp	read temperature sensors in a 1-Wire net
drawtiming	tool for documenting hardware designs through timing diagrams
electric	electrical CAD system
esptool	create and flash firmware files to ESP8266 and ESP32 chips
flashrom	Identify, read, write, erase, and verify BIOS/ROM/flash chips
flexloader	utility to configure SRAM based ALTERA devices
fped	Footprint editor
fpga-icestorm-chipdb	Chip database files for fpga-icestorm
fpga-icestorm	Tools to handle the bitstream format of Lattice iCE40 FPGAs
freehdl	VHDL simulator for Linux
fritzing	Easy-to-use electronic design software
fritzing-parts	Easy-to-use electronic design software (parts files)
gerbv	Gerber file viewer (only RS 274 X format)
ghdl-gcc	VHDL compiler/simulator (GCC backend)

name	package description
ghdl	VHDL compiler/simulator
ghdl-llvm	VHDL compiler/simulator (LLVM backend)
ghdl-mcode	VHDL compiler/simulator (mcode backend)
glogic	graphical logic circuit simulator
gnucap-default-plugins0	GNU Circuit Analysis package, default plugins
gnucap	GNU Circuit Analysis package, main executable
gnusim8085	Graphical Intel 8085 simulator, assembler and debugger
gplcver	Verilog simulator
gpsim	Simulator for Microchip's PIC microcontrollers
gputils	GNU PIC utilities
graywolf	Placement for digital VLSI design
gtkwave	VCD (Value Change Dump) file waveform viewer
gwave	waveform viewer eg for spice simulators
horizon-eda	EDA layout and schematic application
imx-code-signing-tool	code signing tool for i.MX platform
imx-usb-loader	imx_loader - i.MX/Vybrid recovery utility
irsim	Switch-level simulator
iverilog	Icarus verilog compiler
kicad-demos	Demo projects for kicad
kicad-footprints	Footprint symbols for KiCad's Pcbnew
kicad	Electronic schematic and PCB design software
kicad-packages3d	3D models for 3D viewer in KiCad's Pcbnew and Footprint Editor
kicad-symbols	Schematic symbols for KiCad's Eeschema
kicad-templates	Project templates for KiCad
klayout	High Performance Layout Viewer and Editor
langford-utils	Control programs for the Per Vices Noctar IQ demodulator board
lepton-eda	Lepton Electronic Design Automation (metapackage)
listserialportsc	list serial ports
lpctools	interface to NXP LPC Microcontrollers ISP serial interface
m16c-flash	Flash programmer for Renesas M16C and R8C microcontrollers
magic	VLSI layout tool
mcu8051ide	Graphical Integrated Development Environment for 8051
mspdebug	debugging tool for MSP430 microcontrollers
myhdl-cosimulation	MyHDL cosimulation files
nbc	C compiler for LEGO Mindstorms NXT bricks
netgen-lvs	Netlist comparison - Layout vs Schematic (LVS)
ngspice	Spice circuit simulator
nitpic	simulator for the Microchip PIC16C84 microcontroller
nxt-firmware	Improved firmware for LEGO Mindstorms NXT bricks
octave-openems	Octave interface for openems
openems	Electromagnetic simulator
opensta	Gate-level Static Timing Analyzer

name	package description
owfs-fuse	1-Wire filesystem
owfs	Dallas 1-wire support
owftpd	FTP daemon providing access to 1-Wire networks
owhttpd	HTTP daemon providing access to 1-Wire networks
owserver	Backend server for 1-Wire control
ow-shell	shell utilities to talk to an 1-Wire owserver
ow-tools	tools to monitor or inspect a ow-server link
pcb2gcode	command-line tool for engraving PCBs using CNCs
pcb-gtk	printed circuit board (pcb) design program - GTK+ interface
pcb	printed circuit board (pcb) design program - metapackage
pcb-lesstif	printed circuit board (pcb) design program - LessTif interface
pcb-rnd-auto	Autoroute and autoplacement.
pcb-rnd-cloud	Networking plugins.
pcb-rnd-debug	Debug and diagnostics.
pcb-rnd-export-extra	Export formats: special/extra
pcb-rnd-export	Common export plugins.
pcb-rnd-export-sim	Export plugins to simulators
pcb-rnd-extra	Extra action commands and optional functionality.
pcb-rnd-hid-gtk2-gdk	GUI: gtk2, software render
pcb-rnd-hid-gtk2-glib	GUI: gtk2, opengl
pcb-rnd-hid-lesstif	GUI: motif/lesstif, software render
pcb-rnd	Standard installation of pcb-rnd
pcb-rnd-import-geo	Geometry import plugins.
pcb-rnd-import-net	Netlist/schematics import plugins.
pcb-rnd-io-alien	File format compatibility with other PCB layout designers.
pcb-rnd-io-standard	Commonly used non-native board and footprint file formats
pcb-rnd-lib-glib	Support library for rendering with opengl.
pcb-rnd-lib-gtk	Support library for building the GUI with gtk.
pcb-rnd-lib-gui	Support library for building the GUI.
pcb-rnd-lib-io	Support library for alien file formats.
pd-pduino	interfacing with the Arduino from within Pure Data (Pd)
pd-xbee	interfacing with your XBee from within Pure Data (Pd)
picprog	Microchip PIC serial programmer software
pulseview	sigrok logic analyzer, oscilloscope, and MSO GUI
pycirkuit	front-end for "Circuit Macros" and the PIC language
qflow	Open-Source Digital Synthesis Flow
qflow-tech-osu018	Technology files needed for qflow for osu018
qflow-tech-osu035	Technology files needed for qflow for osu035
qflow-tech-osu050	Technology files needed for qflow for osu050
qrouter	Multi-level, over-the-cell maze router
rfdump	tool to decode RFID tag data
s51dude	In-System Programmer for 8051 MCUs using usbtiny

name	package description
scantool	OBD-II vehicle diagnostic scanner
sdcc	Small Device C Compiler
sdcc-libraries	Small Device C Compiler (libraries)
sdcc-ucsim	Micro-controller simulator for SDCC
sigrok-cli	command-line frontend for the sigrok software
sigrok-firmware-fx2lafw	Firmware for Cypress FX2(LP) based logic analyzers
sigrok	Logic analyzer and protocol decoder software suite (metapackage)
simavr	lean and mean AVR simulator
simulavr	Atmel AVR simulator
simulide	simple real time electronic circuit simulator
simulpic	simulator for Microchip PIC16F84 microcontroller
spectools	Utilities for using the Wi-Spy USB spectrum analyzer hardware
spim	MIPS R2000/R3000 emulator
stlink-gui	OpenSource ST-Link tools replacement.
stlink-tools	OpenSource ST-Link tools replacement.
stm32flash	STM32 chip flashing utility using a serial bootloader
t2n	Simple command-line tool for LEGO Mindstorms NXT
tclspice	NGSpice library for Tcl
tkgate	Tcl/Tk based digital circuit editor and simulator
uhubctl	USB hub per-port power control
uisp	Micro In-System Programmer for Atmel's AVR MCUs
usbrelay	USB HID relay driver
verilator	fast free Verilog simulator
vish	Commandline interface for Virtual Instrument Software Architecture
w1retap	Data logger for 1-Wire weather sensors
w1retap-mongo	Data logger for 1-Wire weather sensors (MongoDB plugin)
w1retap-mysql	Data logger for 1-Wire weather sensors (MySQL plugin)
w1retap-odbc	Data logger for 1-Wire weather sensors (ODBC plugin)
w1retap-pgsql	Data logger for 1-Wire weather sensors (PostgreSQL plugin)
w1retap-sqlite	Data logger for 1-Wire weather sensors (SQLite plugin)
xc3sprog	JTAG flashing tool for FPGAs, CPLDs and EEPROMs
xcircuit	Draw circuit schematics or almost anything
xschem	schematic capture program
yosys	Framework for Verilog RTL synthesis

Engineering

Every home-brewed ham project involves some amount of engineering...

```

$ ( aptitude -F'%p' search '~r native ~Rrecommends: science-engineering'
  aptitude -F'%p' search '~r native ~Rsuggests: science-engineering' ) \
|xargs apt-cache show \
|awk '/^Package/{name=$2} \
/^Description-en/{$1="";sub(FS,"");description=$0} \
/^Homepage/{url=$2} \
/^$/{if(url) {printf("|\"name\"|\"url\"|\"description\"|\n");
url=""} \
      else {printf("|\"name\"|\"description\"|\n")}}' \
|sed -e '/.*-common/d' -e '/.*-core/d' \
-e '/.*-data/d' -e '/.*-dev/d' -e '/.*-doc.*d' \
-e '/^|lib.*d' -e '/^\[lib.*d' \
|sort -u \
> ../doc/engineering.tmp

```

Table 3: Engineering packages distributed with Xubuntu LTS

name	package description
ann-tools	Approximate Nearest Neighbor Searching library (tools)
calculix-ccx	Three-Dimensional Structural Finite Element Program
calculix-ccx-test	Three-Dimensional Structural Finite Element Program (documentation files)
calculix-cgx-examples	Example files for Calculix GraphiX
calculix-cgx	Calculix cgx is a 3-dimensional pre- and post-processor for fem
cba	Continuous Beam Analysis
cgns-convert	CFD General Notation System - Conversion tools
code-saturne-bin	General purpose Computational Fluid Dynamics (CFD) software - binaries
code-saturne	General purpose Computational Fluid Dynamics (CFD) software
code-saturne-include	General purpose Computational Fluid Dynamics (CFD) software - includes
dime	DXF Import, Manipulation, and Export programs
fenics	Automated Solution of Differential Equations
freecad	Extensible Open Source CAx program
gerris	Fluid Flow Solver
getdp	general environment for the treatment of discrete problems
gmsh	Three-dimensional finite element mesh generator
hdfview	Java HDF Object viewer
lxi-tools	LAN eXtensions for Instrumentation (LXI) software interface
metis-edf	Family of Multilevel Partitioning Algorithms
netgen	Automatic 3d tetrahedral mesh generator
oce-draw	OpenCASCADE Community Edition CAE platform shared library
openfoam	Open source toolbox for Computational Fluid Dynamics (CFD) - binaries
openturns-examples	examples of OpenTURNS functionalities
python3-admesh	Python bindings for the ADMesh (Python 3)
python3-collada	Python 3 module for creating, editing and loading COLLADA
python3-dolfin	Python interface for DOLFIN (Python 3)
python3-escript	Esript/Finley finite elements Python3 system (with OpenMP)
python3-escript-mpi	Esript/Finley finite elements Python3 system (OpenMP + MPI)
python3-fiat	tabulation of finite element function spaces (Python 3)
python3-fluids	Python 3 fluid dynamics and engineering design library
python3-netcdf4	Python 3 interface to the netCDF4 (network Common Data Form) library
python3-openturns	Python3 front-end of OpenTURNS (aka TUI)
python3-pygalmesh	Python 3 frontend to CGAL's 3D mesh generators
python3-pynfft	Python bindings for the NFFT3 library - Python 3
python3-silo	Python3 interface to the SILO Scientific I/O library
r-cran-rnetcdf	GNU R package that provides an R interface to NetCDF datasets

name	package description
r-cran-spc	GNU R Statistical Process Control
sailcut	Sail design and plotting software
scram	Probabilistic Risk Analysis Tool
solvespace	Parametric 2d/3d CAD
tetgen	Quality Tetrahedral Mesh Generator
z88	Finite Element Analysis Program - runtime

Science

In the section `universe/science`, there are more packages of interest to the amateur radio operator. The reason why these packages did not show up before is in part due to poor package classification.

```
$ aptitude -F%p' search '~r native ~s universe/science' \
  |grep -e astronomical-almanac -e aweather -e fcd- -e openuniverse -e
savi -e seti -e stellarium -e wfrog -e xtide \
  |xargs apt-cache show \
  |awk '/^Package/{name=$2} \
    /^Description-en/{$1="";sub(FS,"");description=$0} \
    /^Homepage/{url=$2} \
    /$/{if(url) {printf("|["name"]("url")|description"|\\n");
url=""}} \
    else {printf("|"name|"description"|\\n)}}}' \
  |sed -e '/.*-common/d' -e '/.*-core/d' \
    -e '/.*-data/d' -e '/.*-dev/d' -e '/.*-doc.*d' \
    -e '/^|lib.*d' -e '/^|lib.*d' \
  |sort -u \
  > ../doc/science.tmp
```

Table 4: Science packages of interest distributed with Xubuntu LTS

name	package description
astronomical-almanac	astronomical almanac - calculate planet and star positions
boinc-app-seti-graphics	SETI@home application for the BOINC client (with graphics)
boinc-app-seti	SETI@home application for the BOINC client
openuniverse	3D Universe Simulator
qthid-fcd-controller	Funcube Dongle controller
savi	satellite constellation visualisation
stellarium	real-time photo-realistic sky generator
xtide-coastline	coastline data for xtide
xtide	provides tide and current predictions

Even more

H Check out [Hamsoft](#), for even more ham software which perhaps is not distributed with (X)Ubuntu. Also, —if your really need to— much Windows™-only software will run flawlessly on GNU/Linux by using tools such as [PlayOnLinux](#). In another article, you can read about my experience running [closed source ham radio software on GNU/Linux](#).

Telnet into a DX-Cluster

Here is another little trick if you like to connect to a DX-cluster with telnet in the command line. Precede the telnet command with a rlrwrap command. Doing so, will provide [command history via the up !\[\]\(3d8c13c92b853674f749aac6fa869926_img.jpg\) and down !\[\]\(ce455c990c00145a2dda1d9a310cb682_img.jpg\) arrows](#), which is quite handy.

```
$ rlrwrap telnet nolcluster.on8ar.eu 7300
```

Obviously, (X)Ubuntu also has DX-cluster clients with a graphical user interface (GUI) and computer aided tuning (CAT) on offer. One such program is [xdx](#) and comes with the standard repository.



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Last update: Monday, March 1, 2021.