

Embedded Linux OS description

Access Touch

2.x

3.x

Version	Date	Author	Description
1.00	23.06.2010	Juv	First version
1.01	30.11.2010	Jpo	DHCP added
1.02	30.09.2011	Ara	.xinitrc default updated, accesstouchv2-info added, some security features added

Access Touch 2.X & 3.X runs on the Voyage Linux operating system, a stripped-down version of [Debian 5](#).

Debian 5 is composed of software packages released as free and open source software under the GNU General Public License and other free software licenses. The primary form, Debian GNU/Linux, assembled from the Linux kernel and GNU OS tools, is a popular and influential GNU/Linux product. Its standard distribution includes access to thousands of additional freeware applications ready for installation and use.

Debian is known for its strict adherence to the philosophies of Unix and freeware, including adherence to collaborative software development and testing processes.

Basic features:

- Customized kernel: 2.6.31-13
- Based on [Voyage Linux](#) (Debian 5-based; <http://Linux.voyage.hk/>)
- Highly-secure customized embedded Linux OS
- Functions in read-only mode, but also readily customizable to user needs.
- Easy firewall configuration.
- Quick boot time
- Comparatively small OS footprint: ca. 400Mb
- Hardware configurable for 'diskless' operation via pxe preboot environment.
- Built-in uninterruptible power supply management utility. Automatically shuts/starts unit when power down/up.
- Easy software installation with APT package management
- [DPMS](#) graphical display power management
- Deploys [FluxBox](#), lightweight, powerful windowmanager
- Onscreen virtual keyboard
- As a default DHCP is set on (dynamic IP address)

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1. About the Manual

1.1. Reading the Manual

* requires root permissions (see 4.1 below) and cannot be executed as a regular user account.

** must be edited with root permissions

Bold text indicates executable commands or editable files.

Italic text indicates special caution is needed.

(e.g. *All system modification commands must be executed when OS is in Read/Write mode!*)

for the rest of this document, AccessTouch is referred to as 'AT'

2. Overview

2.1. What is Debian

The [Debian Project](#) is an association of programmers who have made it their common cause to create, provide and support a free operating system. The name of this operating system is Debian GNU/Linux, or simply Debian for short.

An operating system is the set of basic programs and utilities that make your Access Touch run. The core of an operating system is what is often referred to as the 'kernel'. The kernel is the most fundamental program on your Access Touch, performing all the basic housekeeping on it and enabling you to start other applications.

Debian operating systems currently use the Linux kernel. Linux is an operating system created in 1997 by Linus Torvalds that today is supported by literally thousands of programmers worldwide.

A large part of the basic tools that fill out the Linux operating system come from the GNU project; hence the names: GNU/Linux and GNU/Hurd. These tools are also free.

Naturally, the thing that people want most is application software: programs enabling them to accomplish their goals, whether editing documents or running a business to playing games or creating software. Debian comes with over 25000 applications, precompiled and bundled in a convenient format for quick and easy installation on your Access Touch — all free.

It's a bit like a tower. At the bottom is the kernel. Above that are numerous basic tools. Above that resides the software you install and run on your Access Touch. At the very top of your tower is Debian — carefully organizing and fitting everything together so it all works seamlessly and reliably for you.

2.2. What is Voyage Linux

Voyage Linux is a Debian release codenamed 'Lenny' (or release 5.0) built entirely from scratch. It runs best on an x86-based embedded platform. It also runs on low-end x86 PC platforms. AT Linux OS is customized Voyage Linux installation.

2.3. Idesco[®]-customized AT OS

The default size for the operating system is approx. 400MB. This customized OS is derived from Voyage-Linux. The version of Idesco AT OS's filesystem can be checked from file `/etc/accesstouchv2-info`. This file includes also AT serial number unique for every AT.

3. Read-only file system

3.1. Basics

One significant difference between Debian Linux and AT OS is the support for Compact Flash, Internal SSD and External Sata SSD for running the OS in read-only mode.

The way this works in AT is it's configured so that the 'disk' is very rarely written to, to avoid wear. Most of the file system normally resides in Read-Only (RO) mode.

Consequently and by default, no directories can be written to except for `/var/log` and `/var/tmp`.

3.2. Customizing Read-Write mode

If you require certain directories to be writeable between restarts or power-downs, those directories must be configured for that characteristic.

If needed, you can completely disable RO/RW feature, by commenting-out the line in `/etc/init.d/voyage-util` **

`/usr/local/sbin/remountro` transforms to

`/usr/local/sbin/remountrw`

To make other directories writeable, edit `/etc/default/voyage-util` **. At the line,

`VOYAGE_SYNC_DIRS=""`

insert a space-separated list of directories between the quotation marks. For example, to add `/var/mail` and `/home/someone`, change this line to read

`VOYAGE_SYNC_DIRS="/var/mail /home/someone" **`

The way this works is that `/etc/init.d/voyage-sync` creates an overlay for your selected directories, using the `tmpfs` filesystem, which runs in RAM. Any changes are written to this RAM-based overlay. However, if the power fails or you power down the unit your changes will be lost.

3.3. To make writeable directories persist through a restart

Writeable directories do not retain changes through a restart. Any information written to them is lost. However, you can periodically take 'snapshots' of their modified state by running these commands as the root user (see 4.1 below):

`remountrw *`

`/etc/init.d/voyage-sync sync *`

`remountro *`

*To synchronize files and folders during a normal shutdown, modify `/etc/default/voyage-util`. ** Locate the following line, starting with `VOYAGE_SYNC_RECOVER` and change the line as show above to read,*

`VOYAGE_SYNC_RECOVER="YES"`

4. Accounts

4.1. Root Account

The root user account can read, replace, or remove any file. It can read or write to any attached device. It can read or write to any part of your Access Touch's memory. Therefore, if you have the merest suspicion that a piece of software is flawed or poses a security risk, you should *never* run it as root.

Because of the power of the root account, sensible system administrators must always reserve a generous amount of caution when using it. The best rule of thumb is only perform the barest minimum of operations with your root user account. Different views exist on how to minimize root usage. Increasingly, most Unix-related operating systems go so far as to disable the root account and to deploy privilege-enhancing tools (e.g. [Sudo](#)) to give normal users the ability to run programs as the root user when required.

4.1.1. Root account password

By default, the root account password is set to **root**. To execute commands with root permissions you have to be in root mode. Type the command: **su -** to enter root mode.

Root's home directory is **/root**

4.2. Access Account

An 'access' account is used for everyday usage and it has limited user rights. Each account has a home directory. By default, 'access' home directory is the **/home/access** directory. When you are logged in with an 'access' account, you can:

- Read, write, and use files and directories in the account's home directory.
- Read, write, and use all files and directories to which other users give you permission.
- Read, but not write or use basic system files.

NOTE! You cannot use maintenance/system tools with access account (e.g. **remountrw**, **halt**, **reboot**)

4.2.1. Access account password

By default, the 'access' account password is set to: **access**

4.3. Automatic login and X session

By default, user 'root' will login automatically and start X session with onscreen virtual keyboard and xterm. You can control this behavior by modifying the following file.

4.3.1. `/etc/inittab` **

This file contains automatic login information. Locate the following line and change it as indicated:

```
1:2345:respawn:/bin/login -f root tty1 </dev/tty1 >/dev/tty1 2>&1 ** (this is the default)
```

If you want the user 'access' to login automatically when powering up, modify this line to read:

```
1:2345:respawn:/bin/login -f access tty1 </dev/tty1 >/dev/tty1 2>&1 **
```

If you wish to remove automatic login completely, comment out the above line,

```
#1:2345:respawn:/bin/login -f access tty1 </dev/tty1 >/dev/tty1 2>&1 **
```

and remove the comment from the line

```
#1:2345:respawn:/sbin/getty 38400 tty1
```

4.3.2. /home/access/.bashrc and /root/.bashrc

This file contains automatic environment settings and administers X session startup during logon (enabled by default).

```
# ~/.bashrc: executed by bash(1) for non-login shells.
```

```
export PS1='h:w$ '
```

```
umask 022
```

```
. /etc/bash_completion
```

```
# Comment out rest of this script if you do not want to start X session automatically.
```

```
# xset commands will disable automatic power saving mode
```

```
xset -display :0.0 s blank s off
```

```
xset -display :0.0 dpms 0 0 0
```

```
if [ -z "$DISPLAY" ] && [ $(tty) = /dev/tty1 ]; then
```

```
while true
```

```
do
```

```
# This line defines used touch screen option, choices are resistive, capacitive and usb
```

```
xinit -- -nolisten tcp -layout resistive
```

```
sleep 10
```

```
done
```

```
fi
```

4.3.3. /home/access/.xinitrc and /root/.xinitrc

This file defines which program(s) are executed during X session startup.

Default configuration starts Xterm and Virtual Keyboard with fluxbox windowmanager.

```
/opt/tbupddlx/tblinuxmouse &
```

```
/usr/bin/xterm -geometry 133x25+0+0 &
```

```
xvkbd -geometry 800x208+0+366 &
```

```
exec fluxbox
```

5. Localization

Locale is a utility that tailors application output and functionality according to local conventions (e.g. character set, date and time format, currency, etc.) It uses a set of environmental variables to determine the appropriate behavior of application output within these parameters.

5.1. How to configure

Run **dpkg-reconfigure locales** * to reconfigure the locales package.

5.2. Keyboard layout, console fonts etc.

Run **dpkg-reconfigure console-data** * to load keyboard definitions (keymaps), console fonts for various encodings, character maps (charsets) for use by text applications, and fallback tables allowing substitutions for characters which are unavailable in the current font.

5.3. X keyboard map

The **setxkbmap** command maps your Access Touch's virtual keyboard to a layout determined by the options specified on the command line

Run **setxkbmap 'language'** to setup X session keyboard layout. This command must be run from Xterm.

For example, if you wish to use a Swedish keyboard layout type **setxkbmap se**

NOTE! If you are logged-in as an 'access' user and run X session-related commands in X session running the root account you must setup the display environment setting.

Type **export DISPLAY=:0.0**

5.4. Time and Date

5.4.1. Automatic configuration through NTP

Run **dpkg-reconfigure tzdata** * to setup your current time zone

Run **ntpdate tick.keso.fi** * to setup your time update source. You can find NTP servers from the following site: **www.pool.ntp.org**

5.4.2. How to set BIOS date and time

Run **hwclock --systohc; *** to update time and date to BIOS.

6. Built-in Serial ports

Access Touch HW includes two built-in usb serial ports which are named during the boot process as /dev/ttyS* -ports.

6.1. Internal Serial port

The internal serial port **/dev/ttyS1** communicates with the application controller. All input status reports, output controls, internal RS232 reader, wiegand A reader and wiegand B reader are controlled through this port. Detailed specifications can be found in the Access Touch Protocol Description (Idesco® document C00330E).

6.2. External serial port

The external serial port `/dev/ttyS0` communicates directly with any reader connected to the screw terminal hub "RS232 COM (ETX)".

7. Uninterruptible Power Supply

The **autopower-accesstouch** service in AT monitors the Access Touch power state signal, shutting down the device when the power signal becomes too low. The application controller always activates this signal when it detects a power loss lasting more than 3 seconds. If you need more information about power monitoring from the application controller it can be found in the Access Touch Protocol Description (Idesco® document C00330E).

7.1.1. Enabling/Disabling service

update-rc.d -f autopower-accesstouch remove * command will disable service

update-rc.d -f autopower-accesstouch defaults * command will enable service

7.1.2. Alive Restart

Alive restart is an application controller feature. This command is invoked whenever application software running a COM-express module crashes. The application controller reboots the COM-express module whenever application software is unable to send any serial data for 5 minutes. More information about alive restart on the application controller can be found in the Access Touch Protocol Description (Idesco® document C00330E).

7.2. Controlling power from a customer's application

If you require your own application to administer power state monitoring, Idesco can provide source code (written in C) for deploying such a module within your application.

8. Windowmanager, Fluxbox

Fluxbox is a windowmanager for X based on the [Blackbox 0.61.1](#) code. It is very light on resources and easy to handle but still full of features that provide an easy, extremely fast desktop experience.

AT default installation includes configured fluxbox.

Fluxbox manuals and faq's can be found from fluxbox.org website

8.1. Configuration files

All configurable options are located in the users home directory. The full path to access user config files is `/home/access/.fluxbox/`

Refer to the fluxbox manual (found in fluxbox.org) to change settings as needed.

9. Sound Manager

The sound manager used in AT is ALSA (Advanced Linux Sound Architecture).

ALSA is a set of sound drivers and library with an extensible API providing applications with access to the latest features of sound cards. ALSA provides efficient support for many applications, is fully modularized and is SMP driver and thread-safe.

9.1. ALSA-Mixer

ALSAmixer is a graphical mixer program for ALSA. It is used to configure sound settings and adjust sound volume.

As root, execute the command: **alsamixer**

Store mixer settings with the command: **alsactl store**

10. Onscreen Virtual Keyboard

10.1. Description

Onscreen Virtual Keyboard is based on open source xvkbd virtual keyboard. It has been customized by Idesco® to fit especially AT environment.

xvkbd is a virtual (graphical) keyboard program for X Window System which provides facility to enter characters onto other clients (software's) by clicking on a keyboard displayed on the screen. This may be used for systems without a hardware keyboard such as kiosk terminals or handheld devices. This program also has facility to send characters specified as the command line option to another client.

11. Display power management

11.1. DPMS

VESA Display Power Management Signaling (or DPMS) is a standard from the VESA consortium for managing the power supply of video monitors for computers through the graphics card, e.g. slumbering monitor after a period of no activity in order to save power.

AT display supports DPMS for display power saving

11.2. Scripts

The default installation includes example scripts for managing display power. These scripts reside in the access user's home directory **/home/access**

example script's are **awakescreen.sh** and **shutdownscreen.sh**

11.3. X server configuration: Xorg.conf

Location for X server configuration file is **/etc/X11/xorg.conf**

Default xorg configuration disables all screensaver functions and supports AT hardware. There are two layouts included in xorg.conf. These layouts are loaded when X session is invoked through xinit command. Note! Listening on the public network is disabled in the same command.

xinit -- -nolisten tcp -layout resistive, support's both resistive and capacitive touch panel

xinit -- -nolisten tcp -layout usb, support's external usb mouse

12. APT Package management

The Advanced Packaging Tool, or APT, is a free user-interface that works with core libraries to manage the installation and removal of software on the Debian GNU/Linux distribution and its variants.

APT simplifies the process of managing software on Unix-family computer systems by automating the retrieval, configuration and installation of software packages, either from binary files or by compiling source code.

12.1. Usage

To install applications through apt-get you must update current apt database beforehand. Apt-get is updated with the command **apt-get update** *

the basic commands are

apt-get install 'application name' *, without quotations to install application

apt-get remove 'application name' *, without quotations to remove application

apt-cache search 'text' *, without quotations to search database for something

Note! If you run the command **remove.docs**, apt-get database is removed completely

12.2. Java

The JAVA runtime engine is installed by default.

12.2.1. Java install/remove

apt-get install sun-java6-jre * command will install Sun Java 6 Runtime Engine

apt-get remove sun-java6-jre * command will remove Sun Java 6 Runtime Engine. This action frees approximately 100MB of disk capacity.

12.2.1.1. Librxtx-java

RXTX is a full implementation of Sun's Java CommAPI. It contains native libraries providing serial and parallel communication for the Java Development Toolkit. It is installed by default.

apt-get install librxtx-java * will install serial port support for java

apt-get remove librxtx-java * will remove serial port support for java

13. SSH Service

Secure Shell or SSH is a network protocol allowing secure channel data exchange between two networked devices.

The default installation includes the SSH service which is enabled by default. Only an access user can login remotely through the SSH connection.

For security reasons it is not recommended to allow SSH root direct login. Rather, it is preferable to login as another user, and then switch to root using the **'su -'** command.

13.1. Enable SSH login for root

If you wish to enable root ssh login you need to edit following file

/etc/ssh/sshd_config **

Find line saying **PermitRootLogin no** and change **no** to **yes**

Now you need to restart ssh service executing command **/etc/init.d/sshd restart** *

14. Firewall

A firewall is implemented in AT through iptables. Iptables is a user-space application allowing a system administrator to configure the tables provided by the Linux kernel firewall (implemented as different Netfilter modules) and the chains and rules it stores. For more information and a user guide please see www.netfilter.org

14.1. Default Configuration

Default settings will deny everything else but SSH and PING and PORT 1204 to AT network interface. All outgoing data is allowed by default.

Configuration file for iptables is located at `/etc/iptables.up.rules`

```
:INPUT ACCEPT [0:0]  
:FORWARD ACCEPT [0:0]  
:OUTPUT ACCEPT [19:2436]  
-A INPUT -i lo -j ACCEPT  
-A INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT  
-A INPUT -p tcp -m tcp --dport 22 -j ACCEPT  
-A INPUT -p tcp -m tcp --dport 1204 -j ACCEPT  
-A INPUT -p icmp -m icmp --icmp-type 8 -j ACCEPT  
-A INPUT -j DROP  
COMMIT
```

Command definitions are

- INPUT, used to grant or deny incoming connections to your machine.
- OUTPUT, used to grant or deny outgoing connections from your machine.
- FORWARD, used to forwarding packages across interfaces.

14.2. IPTables basic commands

iptables -L * lists your current rules in iptables.

To modify firewall rules you need to edit the `/etc/iptables.up.rules` file.

After modifying, run the following command to activate the modifications:

```
iptables-restore < /etc/iptables.up.rules *
```

15. Diskless operating

15.1. PXE, Preboot Environment

The Preboot eXecution Environment (PXE, pronounced pixie and also known as Pre-Execution Environment) is an environment to boot computers using a network interface independently of available data storage devices (like hard disks) or installed operating systems.

AT supports booting with PXE. Here are a few benefits of PXE:

- If you have a large number of AT installations to perform on your network and need to ensure all devices have identical configurations, PXE boot is very useful.
- If you need to an easy way to upgrade multiple AT installations on your network, PXE boot simplifies the task.
- If you need to distribute completely new operating systems for installation to numerous ATs in your network, PXE again can simplify the process.

16. AccessTouch Linux Rescue USB stick

16.1. Restore Linux Embedded OS

RESTORE USB STICKS ARE SOLD SEPARATELY. Contact your Idesco salesperson or Idesco support to order or for more information.

16.2. Restore USB stick contents

The Idesco Linux Embedded OS restore CD contains following files:

- restore script to restore whole operating system, AT image
- kernel headers
- kernel source
- IEGD drivers

17. Useful commands

17.1. Test internal/external reader

execute command: **cat /dev/ttyS1** or **tail -f /dev/ttyS1 *** to monitor internal reader

execute command: **cat /dev/ttyS0** or **tail -f /dev/ttyS0 *** to monitor external reader

17.2. Nano, text editor

GNU nano is designed to be a free replacement for the Pico text editor, part of the Pine email suite from The University of Washington. It aims to "emulate Pico as closely as possible and perhaps include extra functionality".

17.3. Shutdown unit

Shutting down unit can be achieved by different methods.

halt * command, will shutdown unit

reboot * command, will reboot unit

17.4. Remove.docs

remove.docs * command deletes all apt databases and temporary files

17.5. Change account passwords

type **passwd accountname *** to change password

18. Notes

18.1. Antivirus protection

Default configuration does not contain antivirus protection. Contact Idesco support for assistance.

18.2. IP forwarding

As default IP forwarding is disabled.

18.3. Kernel Compile

Contact Idesco Support to request source code for kernel.

18.4. Intel GMA-restrictions

Currently, only the kernel up to 2.6.31-13 supports Intel GMA-500 chipset. IEGD driver must be recompiled if you choose to compile your own kernel. Contact Idesco Support to request source code for IEGD driver.