



**SOFTIRON**

**OVERDRIVE 1000**

# Quick Start Guide

v.1.0

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## 1. INTRODUCTION

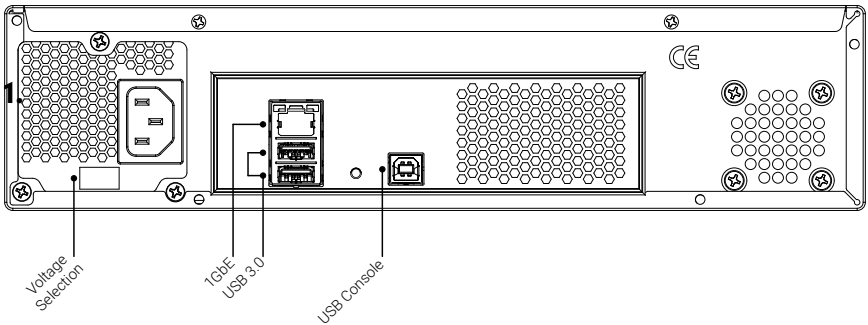
The SoftIron OverDrive 1000 is an entry-level ARMv8-A server based on an AMD Opteron-A A1100 System-on-Chip (SoC). It features:

- AMD Opteron-A SoC with 4 ARM Cortex-A57 cores,
- 8 GB DDR4 RAM,
- 1x Gigabit Ethernet,
- 2x USB 3.0 SuperSpeed host ports,
- 2x SATA 3.0 ports,
- 1 TB hard drive,
- USB Console port.

The OverDrive 1000 is suitable for software development and server tasks on the 64-bit ARMv8-A architecture featuring the A64 instruction set.

## 2. CONNECTIONS

Before connecting power to the OverDrive 1000, ensure that the voltage selection switch on the back of the power supply is properly set for the voltage supplied in your country. If you do not know which setting to use, please contact SoftIron support. The power supply is not auto-sensing, and connecting to the wrong voltage will result in damage to your OverDrive 1000.



### 3. CONSOLE CONNECTION

The OverDrive 1000's main console is implemented as a USB serial port which can be found on the USB Console connector on the back of the case. During boot, all UEFI and kernel messages will go to this console port. Using this console from a host PC is different on each host operating system. Since the console uses USB, settings like baud rate, data bits, and stop bits are fixed and do not need to be specified.

The USB console is powered from USB, and works whenever it is connected to a host PC, even if the OverDrive 1000 is off or its power supply is disconnected. To catch all the boot messages, it's advisable to start up a terminal program on the host PC and connect it to the OverDrive 1000's USB console before powering the OverDrive 1000 on.

#### 3.1 WINDOWS

On Windows systems, first install the drivers and software, which can be downloaded from the website at <http://support.softiron.com/>. Once the drivers are installed, the OverDrive 1000 will show as a virtual com port in the Windows Device Manager as shown in Figure 1.

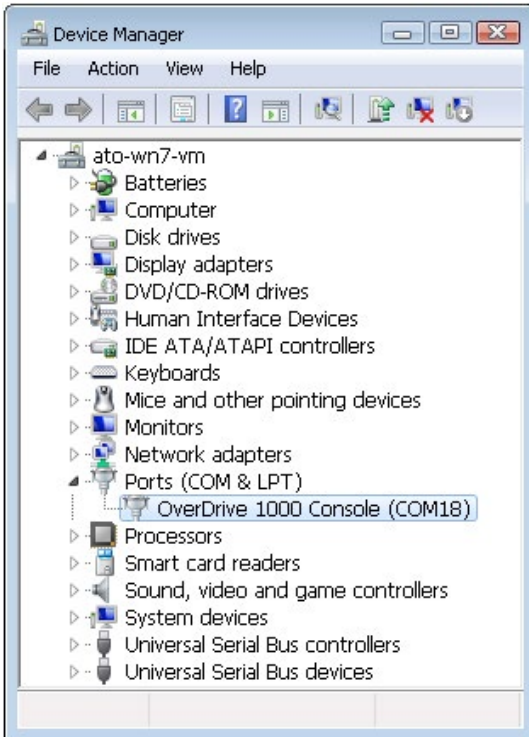


Figure 1

Any terminal application can be used to communicate with the OverDrive 1000, but on Windows PuTTY is recommended because it has good support for the complexities of the UNIX terminal. PuTTY can be downloaded from: <http://www.chiark.greenend.org.uk/~sgtatham/putty/> and configured as shown in Figure 2.

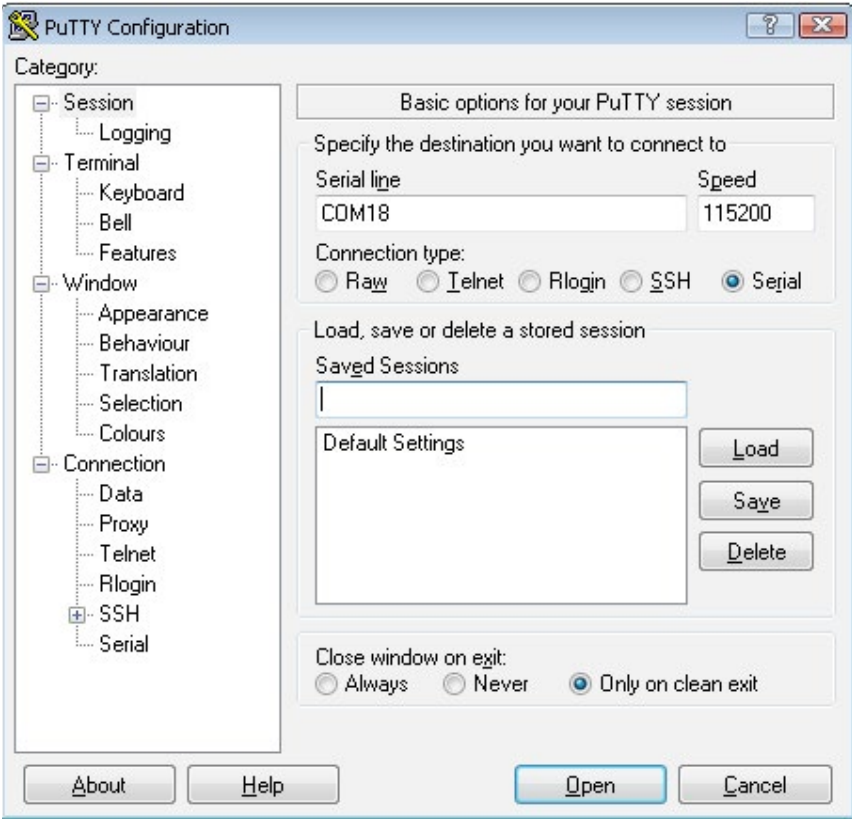


Figure 2

### 3.2 LINUX

On Linux systems, no special drivers are required or provided. **screen** is the recommended terminal program. To use **screen**, first find out which device name is assigned to the OverDrive 1000. From the Linux console, run:

```
dmesg -w
```

to view kernel messages, and then plug in the USB console port. You will see something like the following:

```
[2032117.972729] usb 1-4.3.2: new full-speed USB device
number 77 using ehci-pci
[2032118.067300] usb 1-4.3.2: New USB device found, idVen-
dor=2e02, idProduct=1000
[2032118.067312] usb 1-4.3.2: New USB device strings: Mfr=1,
Product=2, SerialNumber=0
[2032118.067319] usb 1-4.3.2: Product: OverDrive 1000 Console
[2032118.067326] usb 1-4.3.2: Manufacturer: SoftIron, Inc.
[2032118.070073] cdc_acm 1-4.3.2:1.0: ttyACM0: USB ACM device
```

The device name is in the last line, in this case, **ttyACM0**. With this, run **screen** with:

```
screen /dev/ttyACM0
```

Exit **screen** with **Ctrl-A, K**.

### 3.3 MAC OS X

MacOS (OS X), like Linux does not require any special drivers nor are they provided. **screen** is also recommended as it is included with the operating system.

Plug in the USB cable to the OverDrive 1000's USB Console port, and open a terminal window by pressing **Cmd-Space** and typing "Terminal" into the Spotlight search bar. Locate the USB modem device that the Overdrive console enumerated as:

```
$ ls /dev/tty.usb*
/dev/tty.usbmodem1421
```

Then use **screen** to connect to the console:

```
$ screen /dev/tty.usbmodem1421
```

Exit **screen** with **Ctrl-A, K**.

### 3.4 POWER-UP PROCEDURE

In order to see all the bootup messages, it's advisable to connect the USB console port to a PC before powering up the OverDrive 1000. Power up the OverDrive 1000 by pressing and releasing the power button on the front of the case. During power-up, there is no output on the console for around 20 seconds, after which output from UEFI, the GRUB bootloader, and then the Linux kernel are shown. A typical bootup session is shown here:

```

NOTICE: BL3-1:
NOTICE: BL3-1: Built : 14:04:15, Apr  9 2016
INFO:    BL3-1: Initializing runtime services
INFO:    BL3-1: Preparing for EL3 exit to normal world
INFO:    BL3-1: Next image address = 0x8000e80000
INFO:    BL3-1: Next image spsr = 0x3c9

```

Press ESCAPE for boot options .....

Welcome to GRUB!

GNU GRUB version 2.02-beta2

```

/-----\
|*openSUSE                                     |
| Advanced options for openSUSE               |
|                                              |
\-----/

```

Use the ^ and v keys to select which entry is highlighted.

Press enter to boot the selected OS, `e' to edit the commands before booting or `c' for a command-line.

The highlighted entry will be executed automatically in 10s.

Booting `openSUSE'

Loading Linux 4.4.27-1-default ...

Loading initial ramdisk ...

EFI stub: Booting Linux Kernel...

EFI stub: Using DTB from configuration table

EFI stub: Exiting boot services and installing virtual address map...

[FAILED] Failed to start Resume from hiberna...X-00BN5A0\_WD-WCC3F4XA0ZZ3-part4.

See 'systemctl status "systemd-hibernat...0ZZ3\\x2dpart4.service"' for details.

[ OK ] Reached target Local File Systems (Pre).

[ OK ] Reached target Local File Systems.

[ OK ] Reached target System Initialization.

[ OK ] Reached target Basic System.

[ OK ] Found device WDC\_WD10EZEX-00B ROOT.

Starting File System Check on /dev/...00BN5A0\_WD-WC-C3F4XA0ZZ3-part3...

[ OK ] Started File System Check on /dev/d...X-00BN5A0\_WD-WCC3F4XA0ZZ3-part3.

## Mounting /sysroot...

```

[ OK ] Mounted /sysroot.
[ OK ] Reached target Initrd Root File System.
       Starting Reload Configuration from the Real Root...
[ OK ] Started Reload Configuration from the Real Root.
[ OK ] Reached target Initrd File Systems.
[ OK ] Reached target Initrd Default Target.
       Starting Cleaning Up and Shutting Down Daemons...
[ OK ] Stopped dracut cmdline hook.
[ OK ] Stopped target Timers.
[ OK ] Stopped target Remote File Systems.
[ OK ] Stopped target Remote File Systems (Pre).
[ OK ] Stopped Cleaning Up and Shutting Down Daemons.
[ OK ] Stopped target Initrd Default Target.
[ OK ] Stopped target Basic System.
[ OK ] Stopped target Sockets.
[ OK ] Stopped target Slices.

[ OK ] Stopped target Paths.
[ OK ] Stopped Dispatch Password Requests to Console Directory Watch.
[ OK ] Stopped target System Initialization.
[ OK ] Stopped udev Coldplug all Devices.
[ OK ] Stopped Apply Kernel Variables.
[ OK ] Stopped Load Kernel Modules.
[ OK ] Stopped target Swap.
[ OK ] Stopped target Local File Systems.
[ OK ] Stopped target Local File Systems (Pre).
       Stopping udev Kernel Device Manager...
[ OK ] Stopped udev Kernel Device Manager.
[ OK ] Stopped Create Static Device Nodes in /dev.
[ OK ] Stopped Create list of required static device nodes for the current kernel.
[ OK ] Closed udev Kernel Socket.
[ OK ] Closed udev Control Socket.
       Starting Cleanup udevd DB...
[ OK ] Started Cleanup udevd DB.
[ OK ] Reached target Switch Root.
       Starting Switch Root...

```

```

Welcome to openSUSE Leap 42.2 - Kernel 4.4.27-1-default (ttyAMA0).

```

```

linux login: root

```



```
Password:
```

```
Last login: Mon Nov 28 22:41:39 on ttyAMA0
Have a lot of fun...
linux:~ #
```

### 3.5 LOGGING IN

The default login for the pre-installed Linux OS is:

Username: `root`

Password: `linux`

## 4. UEFI BOOT ENVIRONMENT

The OverDrive 1000 uses UEFI as its pre-boot environment. This environment is based on the Tianocore edk2 project hosted by Intel along with platform software from Linaro and its OpenPlatformPkg project. The UEFI software on the OverDrive 1000 can be built by the user from the upstream sources. More information on building the firmware is available at <http://support.softiron.com>, but the build procedure is outside the scope of this document.

At boot time, the UEFI environment can be configured by pressing the **ESC** key on the console when the text

```
Press ESCAPE for boot options .....
```

is seen on the screen. The configuration of the pre-boot environment is outside the scope of this document, but is similar to other pre-boot environments on PC's and servers.

### 4.1 RESTARTING AND SHUTTING DOWN

The OverDrive 1000 can be shut down or restarted using the familiar Linux commands `shutdown`, `halt`, and `reboot`. In addition, pressing the power switch on the case will immediately power off the OverDrive 1000 without going through any software shutdown procedure.

### 4.2 ADVANCED MAINTENANCE

The USB console connection can also be used to update the UEFI firmware and EEPROM contents. The firmware update tools are part of the firmware update packages which can be downloaded from <http://support.softiron.com>. The tools can be used to flash firmware updates which come from SoftIron as well as user-built UEFI images, all without the need for an external programmer. Updating the firmware is only currently supported from a Linux

host PC.

### 4.3 UPDATING THE UEFI IMAGE

1. Download a firmware update package for OverDrive 1000 from <http://support.softiron.com> . This contains the user space firmware update tools.

2. Extract the archive with:

```
tar -xvf overdrive1000_firmware.tar.gz
```

3. Build the flasher tool with:

```
make -C flasher
```

4. Make sure the OverDrive 1000 is powered on.
5. Press and hold the maintenance button on the back of the OverDrive 1000 case for 5 seconds. This unlocks the flasher functionality for 10 minutes. (Alternatively, if you press and hold it for 10 seconds, it will unlock the flasher tool until the USB console is disconnected. ***This can be good for those doing UEFI development, but can be a security issue on a production system.***)
6. Flash the firmware with:

```
sudo ./flasher/flasher --program --verify OVERDRIVE1000_ROM.fd\
--verbose --flash
```

### 4.4 UPDATING THE EEPROM

The AMD A1000 SoC uses an EEPROM for configuration and to store memory training information. If this EEPROM ever needs to be reset or upgraded, use the following procedure:

1. Download a firmware update for OverDrive 1000 from <http://support.softiron.com>. This contains the user space firmware update tools.

2. Extract the archive with:

```
tar -xvf overdrive1000_firmware.tar.gz
```

3. Build the flasher tool with:

```
make -C flasher
```

4. Make sure the OverDrive 1000 is powered on.

- Press and hold the maintenance button on the back of the OverDrive 1000 case for 5 seconds. This unlocks the flasher functionality for 10 minutes. (Alternatively, if you press and hold it for 10 seconds, it will unlock the flasher tool until the USB console is disconnected. *This can be good for those doing UEFI development, but can be a security issue on a production system*)
- Write the EEPROM image:

```
sudo ./flasher/flasher --program --verify eeprom.bin --verbose \
--eeprom
```

#### 4.5 UPDATING THE INTERFACE CHIP FIRMWARE

The OverDrive 1000 has a interface chip / microcontroller which implements the USB console, programs the UEFI flash and EEPROM, and controls the fans. If the PIC32 firmware needs to be updated, use the following procedure:

- Download a firmware update for OverDrive 1000 from <http://support.softiron.com> . This contains the user space bootloader tool.
- Extract the archive with:

```
tar -xvf overdrive1000_firmware.tar.gz
```

- Build the bootloader tool with:

```
make -C bootloader
```

- Power off the OverDrive 1000 and unplug the power cable.
- Unplug the OverDrive 1000's USB console.
- Press and hold the maintenance button on the back of the OverDrive 1000 case. While holding the maintenance button, plug the USB Console into a Linux PC. (The main power should remain unplugged).
- If you then run `dmesg` on the Linux PC, you'll see the last messages:

```
[402.968768] usb 1-4.3.2: new full-speed USB device number 82
using ehci-pci
[403.063111] usb 1-4.3.2: New USB device found, idVendor=2e02
, idProduct=1001
[403.063116] usb 1-4.3.2: New USB device strings: Mfr=1,
Product=2, SerialNumber=0
[403.063119] usb 1-4.3.2: Product: OverDrive 1000 Bootloader
```

```
[403.063122] usb 1-4.3.2: Manufacturer: SoftIron, Inc.
```

8. Write the Interface Chip firmware:

```
sudo ./bootloader/bootloader pic32_firmware.hex --verify/  
--reset
```

## 5. SOFTWARE

The OverDrive 1000 comes pre-installed with the openSUSE Leap 42.2 Linux distribution. Leap is a hybrid distribution, combining the stability of SUSE Linux Enterprise (SLE) with the broad package selection of openSUSE.

More information can be found at:

<https://en.opensuse.org/Portal:Leap>

SUSE distributions are configured using YaST. The best way to use YaST over the USB console is to explicitly set the TERM variable when running it as follows:

```
TERM=xterm-color yast
```

### 5.1 RE-IMAGING THE HARD DRIVE

The distribution on the hard drive is installed from SUSE's OEM images which can be found at:

<http://download.opensuse.org/ports/aarch64/distribution/leap/42.2/appliances/>

The pre-installed image is the `openSUSE-Leap42.2-ARM-JeOS-efi*.raw.xz`, for example:

```
openSUSE-Leap42.2-ARM-JeOS-efi.aarch64-2016.11.25-Build1.1.raw.xz
```

To install the image on a hard drive, it will be necessary to put the hard drive in another computer and copy the image to the drive using the instructions at:

[https://en.opensuse.org/HCL:AArch64\\_EFI](https://en.opensuse.org/HCL:AArch64_EFI)

### 5.2 INSTALLING FROM A CDROM

While the pre-installed version of openSUSE Leap was not installed from a CDROM, ISO images can be downloaded and installed, similar to how they would be installed on a PC. The images for openSUSE Leap 42.2 are located at:

<http://download.opensuse.org/ports/aarch64/distribution/leap/42.2/iso/>

A standard SATA CDROM drive can be connected to the second SATA port on the OverDrive 1000. The boot order may need to be changed in the UEFI menu to boot from the CDROM if a CDROM and a hard drive are connected at the same time.