



## Boxee for Intel CE4100 Installation Guide

### 1. Document History

0.1	06/13/10	<ul style="list-style-type: none"><li>Initial revision. WIP.</li></ul>
0.2	06/27/10	<ul style="list-style-type: none"><li>Overhaul instructions for Samba</li><li>Setup instructions for NTP, HAL and Boxee</li></ul>
0.3	07/06/10	<ul style="list-style-type: none"><li>Additional instructions for network and wifi setup</li><li>Numerous small fixes</li></ul>
0.4	07/15/10	<ul style="list-style-type: none"><li>Correction to the memorymap configuration</li><li>Add LIRC setup</li><li>Update instructions for SMB to also configure NMB</li><li>Increase RAM disk size</li><li>Disable is the default for smbd</li><li>Instructions for fontconfig</li><li>Add ulimit to /etc/profile to disable core files</li><li>Instructions how to disable the Boxee first-run wizard</li><li>Some system configuration files moved to /data/etc/</li></ul>
0.5	07/24/10	<ul style="list-style-type: none"><li>Kernel additions for PPP/PPTP support</li><li>Relocation of PPP/PPTP files to /data/etc/</li></ul>
0.6	07/30/10	<ul style="list-style-type: none"><li>Upgrade to 13.7 w/ Hot Fix</li><li>Add instructions for recovery partition</li><li>Add /opt/local/lib/qt to LD_LIBRARY_PATH</li></ul>
0.7	08/01/10	<ul style="list-style-type: none"><li>Add instructions for EXT4 and EFI GPT. Update instructions for HFS/HFSPLUS.</li></ul>
0.8	09/06/10	<ul style="list-style-type: none"><li>Add instructions for oem.config</li></ul>
0.9	11/16/10	<ul style="list-style-type: none"><li>Instructions for disabling busybox daemonss</li><li>Change memory allocation policy</li></ul>

### 2. Prerequisites

1. This revision of boxee requires Intel CE SDK PR13.7 (125504) and will not work with any other (older or newer) revision of the SDK.

### 3. Setup Procedure For Application Partition

#### 3.1. Basic Setup

1. Create the directory /opt under your target filesystem.

2. Extract the content of the file *boxee-ce4100-<revision>.tar.xz* to /opt under of your target filesystem. This will create /opt/boxee with all the related boxee files, and /opt/local with all the 3<sup>rd</sup> party libraries and tools that boxee requires. In this document we will refer to the root of the target filesystem as \$TARGETFS.
3. Extract the content of the file *boxee-ce4100-addons-v<version>.tar.xz* to a local directory which is not on the target filesystem. This files contains additional files or replacement files for the default Intel provided filesystem and we will copy them as needed. In this document we will refer to the directory where this file was extracted as \$ADDONS.
4. Edit the file /etc/profile in the target. Modify the line:

```
PATH=/usr/local/bin:/usr/bin:/bin:/usr/local/sbin:/usr/sbin:/sbin:/scripts
```

to:

```
PATH=/opt/local/bin:/usr/local/bin:/usr/bin:/bin:/opt/local/sbin:/usr/local/sbin:/usr/sbin:/sbin:/scripts
```

5. Edit the file /etc/profile in the target. Modify the line:

```
LD_LIBRARY_PATH=./usr/local/lib:/usr/lib:/lib:/lib/gstreamer-0.10
```

to:

```
LD_LIBRARY_PATH=./opt/local/lib:/usr/local/lib:/usr/lib:/lib:/lib/gstreamer-0.10:/opt/local/lib/qt
```

6. Add the following to the end of /etc/profile

```
ulimit -S -c 0 > /dev/null 2>&1
```

7. Change the default location of busybox shell history

```
HISTFILE="$HOME/.history"
```

to:

```
HISTFILE="/tmp/.history"
```

### 3.2. Graphics Rendering Quirks

Due to some issues with the graphics rendering, it is required to add the following line to the file /etc/powervr.ini in the target and reboot the target:

```
DisableHWTextureUpload=1
```

### 3.3. Ethernet

The default ethernet startup script (/etc/init.d/network) requires some changes so that dhcpd is not started.

1. Copy the file \$ADDONS/etc/init.d/network to \$TARGETFS/etc/init.d

### 3.4. Broadcom 4319 WiFi Driver

1. Copy the file \$ADDONS/etc/init.d/bcm4319 to \$TARGETFS/etc/init.d
2. Copy (only) the symbolic link \$ADDONS/etc/rc3.d/S16bcm4319 to \$TARGETFS/etc/rc3.d.  
*Pay attention not to dereference the link, use 'cp -d'*

### 3.5. AzureWave AW-NU706H (Ralink RT2870) WiFi Driver

TBD

### 3.6. User "boxee"

While the system boots as "root", the boxee application is executed by user "boxee" for security purposes. To add the user, run the following in the target console:

```
# echo 'boxee:x:1:1:boxee:/home/boxee:/bin/sh' >> /etc/passwd
# echo 'boxee*:1:' >> /etc/group
# mkdir -p /home/boxee
# chown -R boxee.boxee /home/boxee
```

### 3.7. Samba

Samba server (CIFS server) needs to start at boot time.

1. Copy the file \$ADDONS/etc/init.d/smbd to \$TARGETFS/etc/init.d
2. Copy the file \$ADDONS/etc/init.d/nmbd to \$TARGETFS/etc/init.d
3. Copy the file \$ADDONS/etc/smb.conf.in to \$TARGETFS/etc
4. Create (empty) file \$TARGETFS/data/etc/smb.disabled
5. Copy the symbolic link \$ADDONS/etc/rc3.d/S10smbd to \$TARGETFS/etc/rc3.d  
*Pay attention not to dereference the link, use 'cp -d'*
6. Copy the symbolic link \$ADDONS/etc/rc3.d/S11nmbd to \$TARGETFS/etc/rc3.d  
*Pay attention not to dereference the link, use 'cp -d'*
7. Run the following in the target console:

```
# touch /etc/printcap
# echo 'nobody:x:2:2:nobody:/:bin/true' >> /etc/passwd
# echo 'nobody*:2:' >> /etc/group
# echo 'guest:x:65534:65534:smb user:/media:/bin/true' >> /etc/passwd
# echo 'smbgroup*:3:' >> /etc/group
```

### 3.8. Support for HFS+, EXT4 and EFI GPT

HFS+ is the file system that is used on Mac OSX. EFI GPT is the partition table used by Mac. EXT4 is the new version of the EXT filesystem, and is now the default in the recent Ubuntu distributions.

1. You will need to rebuild the kernel with the following configuration parameters:

```
CONFIG_HFS_FS=y
CONFIG_HFSPLUS_FS=y
CONFIG_PARTITION_ADVANCED=y
CONFIG_EFI_PARTITION=y
CONFIG_ACORN_PARTITION=n
CONFIG_OSF_PARTITION=n
CONFIG_AMIGA_PARTITION=n
CONFIG_ATARI_PARTITION=n
CONFIG_MAC_PARTITION=y
CONFIG_BSD_DISKLABEL=n
CONFIG_MINIX_SUBPARTITION=n
CONFIG_SOLARIS_X86_PARTITION=n
CONFIG_UNIXWARE_DISKLABEL=n
```

```
CONFIG_LDM_PARTITION=n
CONFIG_SGI_PARTITION=n
CONFIG_ULTRIX_PARTITION=n
CONFIG_SUN_PARTITION=n
CONFIG_KARMA_PARTITION=n
CONFIG_EFI_PARTITION=y
CONFIG_SYSV68_PARTITION=n
CONFIG_EXT4_FS=y
CONFIG_EXT4DEV_COMPAT=y
CONFIG_EXT4_FS_XATTR=n
```

2. Run the following in the target console:

```
# echo 'hfsplus' >> /etc/filesystems
# echo 'hfs' >> /etc/filesystem
# echo 'ext4' >> /etc/filesystem
```

### 3.9. Support PPP/PPTP

1. If you want to build the kernel modules yourself, configure kernel with the following additional settings. If not, Boxee's package contains the relevant modules.

```
CONFIG_PPP=m
CONFIG_PPP_ASYNC=m
CONFIG_PPP_SYNC_TTY=m
CONFIG_PPP_DEFLATE=m
CONFIG_PPP_BSDCOMP=m
CONFIG_PPP_MPPE=m
CONFIG_PPPOE=m
CONFIG_PPPOL2TP=m
CONFIG_PPP_MULTILINK=n
CONFIG_PPP_FILTER=n
```

2. Copy the symbolic link \$ADDONS/lib/modules/2.6.28 to \$TARGETFS/lib/modules  
Pay attention not to dereference the link, use 'cp -d'

### 3.10. Auto mounting and NTFS 3G

The default 'mount' command provided by Intel's busybox needs to be enhanced with one change: in the .config enable CONFIG\_FEATURE\_MOUNT\_HELPERS. We have provided a binary copy of busybox. To install this version of busybox do the following:

1. Copy the file \$ADDONS/bin/busybox to \$TARGETFS/bin

Also, the version of NTFS 3G provided by Intel is rather old (2008) and misses the important functionality of mounting unicode filesystems. To enable the alternative version run on the target:

```
# ln -s /opt/local/bin/ntfs-3g /sbin/mount.ntfs-3g
# echo 'ntfs-3g' >> /etc/filesystems
```

The auto-mounting functionality provided by default from Intel needs to be modified to mount USB devices on `/media/<Disk Label>` and to support mounting of SD cards (mmc devices). To enable this functionality perform the following:

1. Copy the file `$ADDONS/etc/udev/rules.d/50-udev-gen3.rules` to `$TARGETFS/etc/udev/rules.d`
2. Copy the file `$ADDONS/etc/udev/rules.d/disk_automount.sh` to `$TARGETFS/etc/udev/rules.d`
3. Copy the file `$ADDONS/etc/init.d/devtools` to `$TARGETFS/etc/init.d/devtools`  
There's an extra line in the modified script which deletes `/media/*` It should be done before `udev` is executed.

### 3.11. Memory layout for 1GB RAM

If the system is configured with 1GB of RAM, it is required to set the appropriate memory layout to match it. This information was provided by Intel.

1. In the boot loader set the kernel boot parameters so that instead of (which is set for 512MB):

```
mem=exactmap memmap=1M@0 memmap=199M@1M
```

it will have the value that matches 1GB:

```
mem=exactmap memmap=1M@0 memmap=639M@1M
```

2. In the target edit the file `/etc/platform_config/ce4100/platform_config.hcfg` and modify the SMD memory base address from:

```
media_base_address = 0xC800000      /* 200 Megabytes */
```

to:

```
media_base_address = 0x28000000     /* 640 Megabytes */
```

### 3.12. Freeing Up Unused SMD Memory

*TBD.*

### 3.13. Default Time Zone

Set the default time zone to be New York. Run the following in the target console:

```
# ln -sf /opt/local/share/zoneinfo/America/New_York
/data/etc/localtime
```

### 3.14. NTP

1. Copy the file `$ADDONS/etc/services` to `$TARGETFS/etc/services`
2. The calls to `ntpd` will be done from the HAL.

### 3.14. Increase Size of /tmp

1. Edit the file `/etc/init.d/system_setup`
2. Modify the line with `"/tmp"` and `"size=8m"` to `"size=300m"`

### 3.16. LIRC

If your version of Boxee is compiled with LIRC (look at `guilib/system.h` under `CANMORE` for `HAS_LIRC`), then you must have the LIRC drivers and server installed.

1. Copy the file `$ADDONS/etc/init.d/lircd` to `$TARGETFS/etc/init.d`
2. Copy the symbolic link `$ADDONS/etc/rc3.d/S13lircd` to `$TARGETFS/etc/rc3.d`  
Pay attention not to dereference the link, use `'cp -d'`

3. Copy the symbolic link \$ADDONS/lib/modules/2.6.28 to \$TARGETFS/lib/modules
4. Pay attention not to dereference the link, use 'cp -d'

### 3.17. Fontconfig

It is required to configure fontconfig in order to have fonts in Adobe Flash. Run the following in the target console:

```
# /opt/local/bin/fc-cache -s -f -v
```

### 3.18. File Relocation

Some system files have been relocated from their default /etc location to /data/etc. This is done to permit a read only file system, while retaining Boxee's full functionality.

The relocated files are:

```
/etc/boxeehal.conf
/etc/smb.conf
/etc/smb.disabled
/etc/localtime
/etc/resolv.conf
/etc/ppp/chap-secrets
/etc/ppp/pap-secrets
/etc/ppp/options.pptp
/etc/ppp/resolv.conf
/etc/ppp/peers/vpn
```

Some of these files require symlinking back into /etc for the system to function properly:

```
# ln -sf /data/etc/localtime /etc/localtime
# ln -sf /data/etc/resolv.conf /etc/resolv.conf
# ln -sf /data/etc/ppp/secrets /etc/ppp/pap-secrets
# ln -sf /data/etc/ppp/secrets /etc/ppp/chap-secrets
# ln -sf /data/etc/ppp/options.pptp /etc/ppp/options.pptp
# ln -sf /data/etc/ppp/resolv.conf /etc/ppp/resolv.conf
# ln -sf /data/etc/ppp/peers/vpn /etc/ppp/peers/vpn
```

Additionally, you can relocate Boxee's user data into /data, in case it is implemented as your read/write partition:

```
# mkdir -p /data/.boxee
# ln -sf /data/.boxee /.boxee
```

### 3.19. Temporary Files

Some sub-systems such as Adobe Flash and Samba create temporary utility and cache files. Depending on your setup, you may benefit from a performance improvement by placing these in RAM instead of runtime storage:

```
# ln -sf /tmp /.adobe
# ln -sf /tmp /.macromedia
# ln -sf /tmp /.qws
# ln -sf /tmp /.smb
```

### 3.20. Boxee HAL

Note: The current implementation of Boxee HAL requires a Broadcom 4319 chip for Wifi configuration to work. This is optional and if not applied, then Boxee will have the following capabilities disabled:

- Configuration of network
- Configuration of timezone information
- Configuration of Samba
- Automatic setup of date/time using NTP
- Etc

To enable:

1. Copy the file \$ADDONS/etc/init.d/boxeehal to \$TARGETFS/etc/init.d
2. Make sure there a writable \$TARGETFS/data/etc directory
3. Copy the file \$ADDONS/etc/boxeehal.conf to \$TARGETFS/data/etc
4. Copy the symbolic link \$ADDONS/etc/rc3.d/S94boxeehal to \$TARGETFS/etc/rc3.d  
Pay attention not to dereference the link, use 'cp -d'

### 3.21. Boxee

Perform the following if you want Boxee to start at boot time:

1. Copy the file \$ADDONS/etc/init.d/boxee to \$TARGETFS/etc/init.d
2. Copy the symbolic link \$ADDONS/etc/rc3.d/S99boxee to \$TARGETFS/etc/rc3.d  
Pay attention not to dereference the link, use 'cp -d'

Note: First time Boxee runs, it shows a wizard to configure network. If you do not have Boxee HAL, this will not work. In order to launch Boxee without that wizard, modify /opt/boxee/run\_boxee.sh and add a command line parameter "-nftu" when running the "Boxee" binary.

### 3.22 Running Boxee as limited user

TBD.

### 3.23 OEM Individualization

When Boxee communicates with the Boxee services, it identifies itself using a standard HTTP User-Agent.

By default, Boxee for Sodaville will identify itself as **intel.ce4100**.

In order to further identify your platform to Boxee services, you can declare an addendum to the above User-Agent by setting a string in /opt/boxee/system/oem.config in the following format:

```
Boxee.Device.Name=vendor.device_name
```

Using this unique *vendor.device\_name* string, Boxee will be able to deliver to your users specific content and upgrades, as per your distribution agreement.

Please make sure to notify your Boxee PM, and certify with him/her the vendor and device string used by your system.

### 3.24. Disable servers

Some servers are enabled by default and should be disabled. In the .config of busybox disable the following:

```
CONFIG_INETD=n  
CONFIG_TELNETD=n  
CONFIG_TFTPD=n
```

### 3.24. Change memory allocation policy

Edit /etc/init.d/kernel and comment out the following lines:

```
echo "2" >/proc/sys/vm/overcommit_memory  
echo "100" >/proc/sys/vm/overcommit_ratio
```

### 3.25. Enable compcache

Enable LZO kernel modules:

```
CONFIG_JFFS2_LZO=Y  
CONFIG_CRYPTOLZO=m  
CONFIG_LZO_COMPRESS=m  
CONFIG_LZO_DECOMPRESS=m
```

### 3.25. Auto mounting exFAT

Please follow the instruction of Auto mounting and NTFS (3.10). It is required.

Then, run on the target:

```
# ln -s /opt/local/sbin/mount.exfat /sbin/mount.exfat  
# echo 'exfat' >> /etc/filesystems
```

## 4. Setup Procedure For Recovery Partition

Boxee provides the contents of a secondary partition which should be used as a recovery console and an upgrade tool. The details of that is described in the Plumbing document.

1. Perform the "Basic Setup" as described in the previous section but use the tar file of the recovery console.
2. Perform the procedure "Support for HFS+" as described in the previous section.
3. Perform the procedure "Auto mounting and NTFS 3G" as described in the previous section.

### 4.1. Start Recovery Tool at boot

Perform the following to start the recovery tool at boot time:

1. Copy the file \$ADDONS/etc/init.d/boxee\_recovery to \$TARGETFS/etc/init.d
2. Copy the symbolic link \$ADDONS/etc/rc3.d/S99boxee\_recovery to \$TARGETFS/etc/rc3.d

## 5. Running Boxee

1. Make sure that the target is connected to the Internet (either wired or wireless).
2. Make sure you have either a USB keyboard attached or a working remote control that was provided with the reference board. Keyboard keys that will be used: 4 arrow keys, Enter, ESC. Remote keys that will be used: 4 arrow keys, Select, Back.
3. Connect the target to a TV using the HDMI directly or via an A/V receiver.
4. If you have followed the full setup procedure, you should simply boot your target and boxee will start at boot.
5. When boxee is launched for the first time, you will be guided through a wizard that will help you configure your box for the first time.



## **6. Preparations for Production**

When moving to production, some changes need to be done to the filesystem that we have setup previously.

### **6.1. Disable telnet daemon**

On the target filesystem delete the file `/etc/rc3.d/S09telnetd`