User Manual

UBC-221

Industrial Internet of Things
Gateway

ADVANTECH

Enabling an Intelligent Planet

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

Technical Support and Assistance

1. Visit the Advantech website at http://support.advantech.com where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1x UBC-221 unit with Wall mount bracket
- 2x Female connectors for terminal block.

Ordering Information

Model Number	Description
UBC-221CS-GNA1E	Intel Quark x1000 400MHz w/ PoE

Optional Accessories

Model Number	Description
96PSA-A36W12R1	Adaptor 100-240V 36W 12V 3A
1700001524	3-pin USA standard power cord
170203183C	3-pin Europe standard cord
170203180A	3-pin UK standard power cord.
1700021565-01	Debug cable (DB-9 type)
1652006794-01	Terminal block
SQF-ISDS1-2G-86E	SQFlash SD card SLC 2G (-40 ~ 85° C)

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Chapter 1

General Introduction

This chapter gives background information on UBC-221 series.

1.1 Introduction

UBC-221 is a new generation embedded computing systems based on Intel Quark X1000 processor technology. With fanless and optimized power design, wired/wireless connectivity, and highly integrated I/O for industrial automation, it's the most reliable and economical solution for your intelligent factory. UBC-221 comes equipped with a specially designed mounting bracket and optionally you can purchase a DIN rail or VESA mount. The palm-size box computer offers you a simple solution that can be easily installed in different applications. Supported with WISE-Agent, Yocto Linux and remote management tools for device control and monitoring, UBC-221 can help you create an innovative and smart automatic production line environment connected to the cloud.

1.2 Product Features

1.2.1 Key Features

- Intel® Quark x1000 400MHz processor
- Onboard DDR3-800 512MB memory
- Supports UART and GPIO ports
- Supports 1 Gigabit Ethernet and 1 PoE port
- Supports wallmount bracket for flexible mounting methods
- Low power and fanless design

1.2.2 General

- **CPU:** Onboard Intel Quark x1000 400MHz
- **OS:** Yocto Linux
- **System Memory:** Onboard 512MB DDR3 memory
- **COM Port:** 1 x UART (CTS,RTS,Tx,Rx)
- **USB:** 1 x USB 2.0 Host
- **GPIO:** 2 GPI and 2 GPO
- 2 Green LED for the system power and programmable control.
- **SD slot:** 1 x SD Slot
- **Power input:** +12V DC

1.2.3 Ethernet

- 2 x Gigabit Ethernet ports
- **Speed:** 10/100 Mbps
- **Interface:**
  - 1 x RJ-45 jack with LED
  - 1 x RJ-45 jack with LED and PoE

1.2.4 Power Consumption

- **Typical:** 2.16 Watts.
- **Max:** 2.76 Watts.

1.3 Mechanical Specification

1.3.1 Dimensions

- 143 x 101 x 30 mm (L x W x H) with the metal plate
- 120 x 89 x 30 mm without metal plate
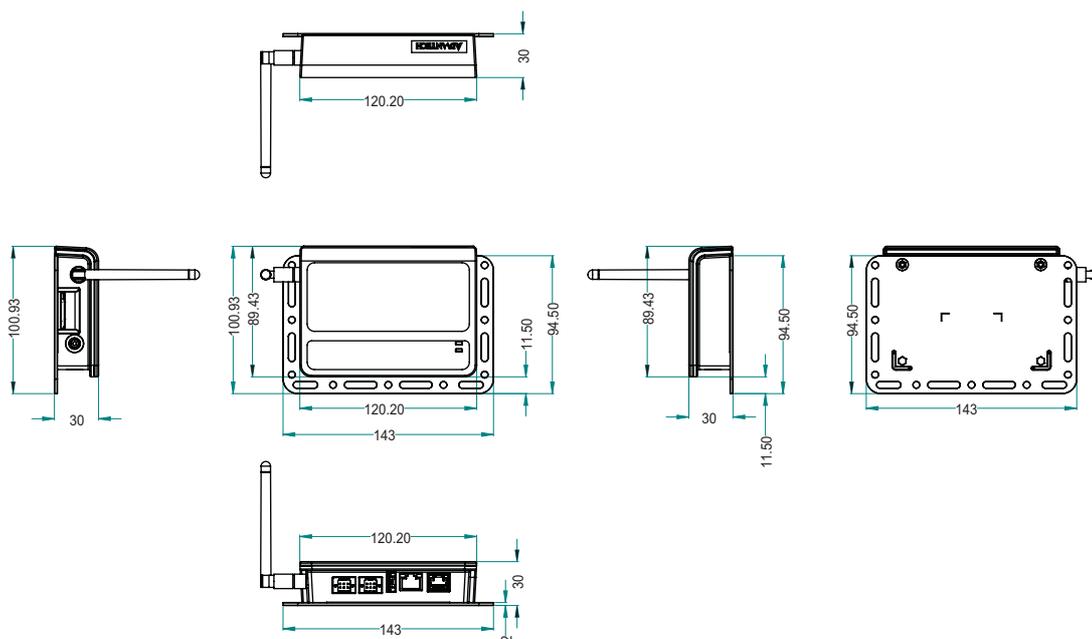
1.3.2 Weight

- 200 g (Net weight)

1.4 Power Requirements

1.4.1 System Power

- **Power input:** DC +12V

1.4.2 RTC Battery

- 3 V/240 mAh

1.5 Environment Specifications

1.5.1 Operating Temperature

- 0 ~ 40° C (32 ~ 104° F)

1.5.2 Relative Humidity

- 95% @ 40° C (non-condensing)

1.5.3 Storage Temperature

- -20 ~ 60° C (-4 ~ 104° F)

1.5.4 Vibration Loading during Operation

1.5.5 EMC

- CE, FCC Class B

Chapter 2

Hardware Functionality

This chapter introduces external I/O and explains the setup procedures of the UBC-221 hardware.

2.1 Introduction

The following sections show the external connectors and pin assignments for applications.

2.2 UBC-221 I/O Indication
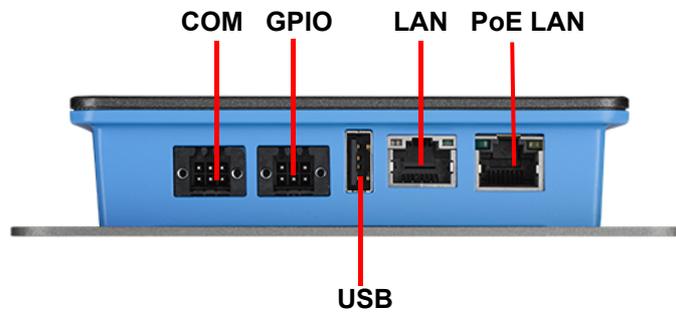
Figure 2.1 UBC-221 front view

Figure 2.2 UBC-221 LED indication

Figure 2.3 UBC-221 left side view

2.3   UBC-221 I/O Connectors

2.3.1   Power Input Connector

The UBC-221 comes with a DC-Jack header that carries 12V DC external power input. The power connector can be fixed by a fastener which is an optional accessory. The fastener avoids power cables falling off.

Figure 2.4 Power input connector

2.3.2   COM Connector

The UBC-221 provides one terminal block 6-pin connector serial communication interface port. The port can support RS-232 mode communication.

Figure 2.5 COM connector

Table 2.1: COM Connector Pin Assignment			
Pin	**Description**	**Pin**	**Description**
1	COM_RTD	2	COM_RTS
3	COM_TXD	4	COM_CTS
5	GND	6	N/C

2.3.3 Ethernet Connector (LAN)

The UBC-221 provides two RJ45 interface connectors. The Ethernet ports are fully compliant with IEEE 802.3x 10/100 and CSMA/CD protocol support. The Ethernet ports provides standard RJ-45 connector with LED indicators on the front side to show Speed/Active status.

LAN: Left is speed (ON-100, OFF-10), Right is Active

PoE: Left is Active, Right is speed (ON-100, OFF-10).

Figure 2.6 Ethernet connector

2.3.4 USB Connector

The UBC-221 uses one USB interface connector that supports high-speed (480 Mbps), full-speed (12 Mbps), and low-speed (1.5 Mbps) operation.

Figure 2.7 USB connector

2.3.5 SD Connector

UBC-221 provides an SD slot. The SD card is essential for booting up the system and for storage as UBC-221 has no onboard storage.

Figure 2.8 SD connector

> **Note!** It is recommended to use only "Transcend and Sandisk" SD Cards which Advantech has verified.

2.3.6 GPIO Connector

The UBC-221 supports two GPI and two GPO with terminal block interface. The GPI has isolation support so it can protect against unexpected power damage.

Figure 2.9 GPIO connector

Table 2.2: GPIO Connector Pin Assignment	
Pin	**Description**
1	GPO_0
2	GPI_0
3	GND
4	GND
5	GPO_1
6	GPI_1

2.4 UBC-221 Hardware Installation

2.4.1 SD Card Installation

1. Remove the power cord.
2. Insert the SD Card directly into UBC-221 from the left side SD slot.

2.4.2 Mini-PCIe Card Installation

1. Unscrew the two screws on the bottom of the case.
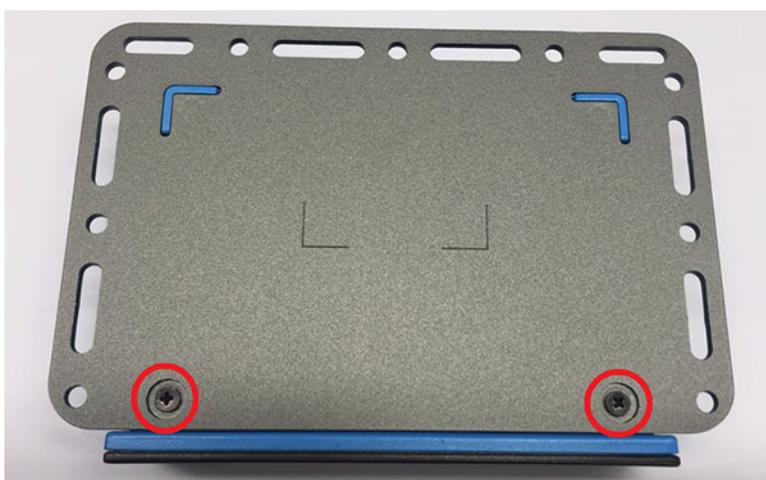
Figure 2.10 Unscrew the two screws

2. Open the top cover.

Figure 2.11 Open the top cover

3. Install your mini-PCIe card, close the top cover and put back the two screws on the bottom of the case.
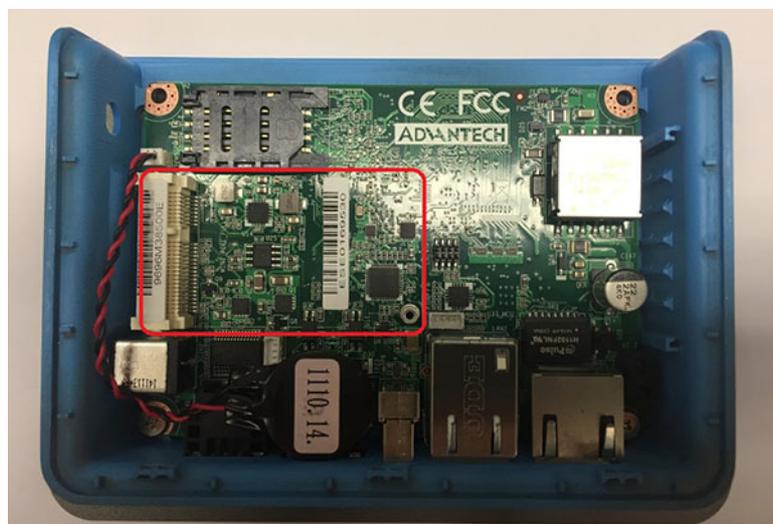
2.4.3 Console Installation

To install the console cable you must:

1. Unscrew the two screws on the bottom of the case.
2. Open the top cover.
3. Install the console cable, close the top cover and put back the two screws on the bottom of the case as shown in Figure 2.12.
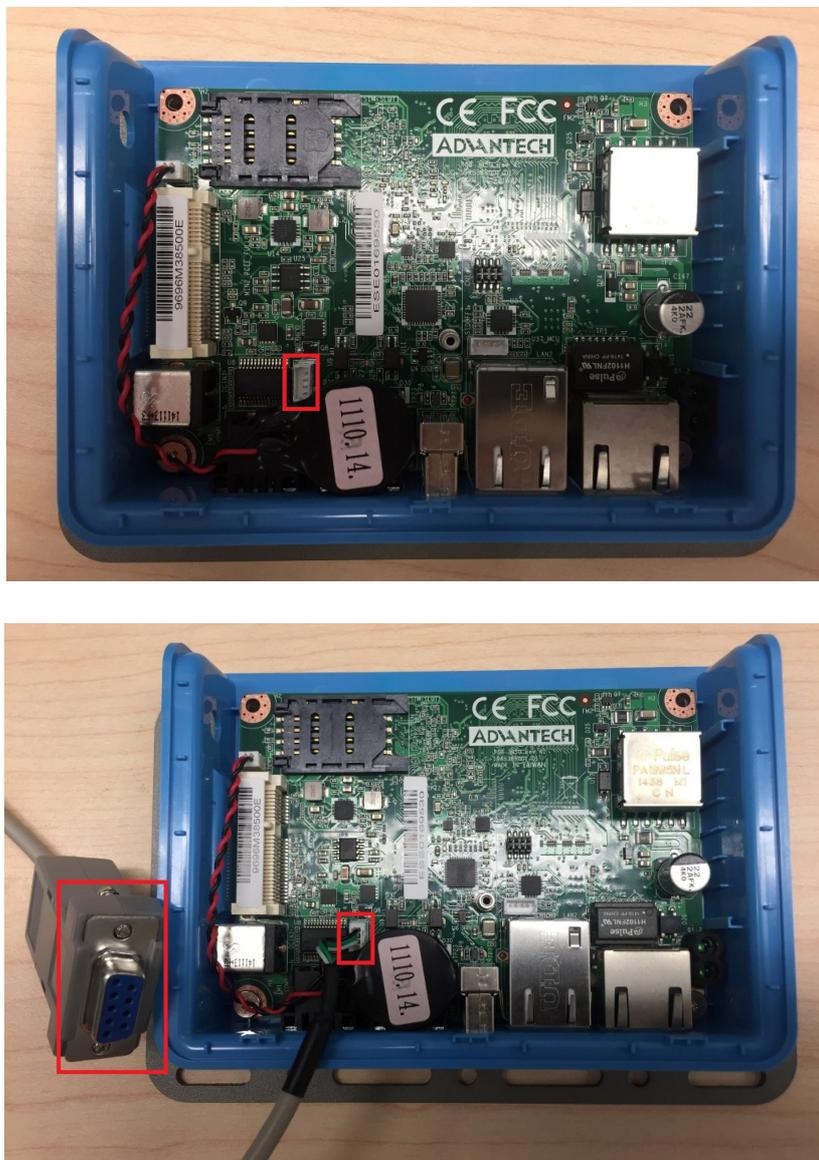
Figure 2.12 Console Installation

2.4.4 Mounting Assembly method

The UBC-221 support flexible wall mounting holes so you can easily fix UBC-221 onto the wall. It also supports a DIN-rail kit (optional) for users who need to mount UBC-221 onto a 35mm DIN-rail.

Chapter 3

Software Functionality

This chapter details the software operating on UBC-221.

3.1 Getting Started and Customization

3.1.1 Getting Started

3.1.1.1 Prerequisites

All operations in this guide are based on Ubuntu 12.04 LTS 64-bit only. First install Ubuntu 12.04 LTS 64-bit* with minimum 2GB memory.

* ubuntu-12.04.1-desktop-amd64.iso

To install required packages

Please login and perform the following commands:

```
sudo apt-get install ssh
sudo apt-get install ia32-libs libx11-dev:i386 libreadline6-
dev:i386 \
   libgl1-mesa-glx:i386 zlib1g-dev:i386 uuid-dev:i386 liblzo2-
   dev:i386 \
   libncurses5-dev:i386
sudo apt-get install \
   bison build-essential ccache dpkg flex gcc g++ gettext intl-
   tool \
   libarchive-zip-perl   libfreetype6-dev   libdbus-glib-1-dev
   liborbit2-dev \
   libxml2-dev libx11-dev libgtk2.0-dev liblzo2-2 libtool m4 \
   patch rpm tcl uboot-mkimage uuid zlib1g zlib1g-dev \
   git gnupg flex bison gperf build-essential  zip \
   curl libc6-dev libncurses5-dev x11proto-core-dev libx11-
   dev:i386 \
   libreadline6-dev:i386  libgl1-mesa-glx:i386  libgl1-mesa-dev
   g++-multilib \
   mingw32  tofrodos  python-markdown  libxml2-utils  xsltproc
   zlib1g-dev:i386 \
   gcc-4.6 g++-4.6 cpp-4.6 gcc-4.6-multilib uuid-dev liblzo2-
   dev \
   uboot-mkimage libarchive-zip-perl \
   wget git-core unzip texinfo gawk diffstat build-essential
   chrpath \
   sed cvs subversion coreutils texi2html \
   docbook-utils python-pysqlite2 help2man make gcc g++ \
   desktop-file-utils libgl1-mesa-dev libglu1-mesa-dev mercu-
   rial \
   autoconf automake groff curl lzop asciidoc xterm
sudo  apt-get  install  libncurses5-dev:i386  liblzo2-dev:i386
uuid-dev:i386
sudo  ln  -s  /usr/lib/i386-linux-gnu/mesa/libGL.so.1  /usr/lib/
i386-linux-gnu/libGL.so
tar zcvf ~/usr_lib_i386-linux-gnu_for_Building_Android_KK.tar.gz \
```

```
   /usr/lib/i386-linux-gnu/
   {libuuid.a,libuuid.so,liblzo2.so,liblzo2.a}
sudo apt-get install uuid-dev liblzo2-dev
sudo tar zxvf ~/usr_lib_i386-linux-gnu_for_Building_Android_KK.tar.gz -C /
```

To install JDK

Please download "jdk-6u45-linux-x64.bin" manually, put it to directory ~/FILES/ and perform the following commands:

```
cd /usr/lib
sudo ~/FILES/jdk-6u45-linux-x64.bin
sudo mkdir jvm; cd jvm
sudo mv ../jdk1.6.0_45 .
cd jdk1.6.0_45/
sudo update-alternatives --install /usr/bin/java     java     /
usr/lib/jvm/jdk1.6.0_45/jre/bin/java     2
sudo update-alternatives --install /usr/bin/javac    javac    /
usr/lib/jvm/jdk1.6.0_45/bin/javac    2
sudo update-alternatives --install /usr/bin/jar      jar      /
usr/lib/jvm/jdk1.6.0_45/bin/jar      2
sudo update-alternatives --install /usr/bin/javap    javap    /
usr/lib/jvm/jdk1.6.0_45/bin/javap    2
sudo update-alternatives --install /usr/bin/javadoc javadoc /
usr/lib/jvm/jdk1.6.0_45/bin/javadoc 2
sudo update-alternatives --config javap
sudo update-alternatives --config javadoc
sudo update-alternatives --config java
sudo update-alternatives --config javac
sudo update-alternatives --config jar
cd ~/
sudo sh -c "echo "JAVA_HOME=/usr/lib/jvm/jdk1.6.0_45" >> /etc/
environment"
```

3.1.1.2 Conventions

`${IMAGE_PACK}`: prebuilt image pack

e.g. `U221LIV1050_quark_2015-05-22.zip`

`${IMAGE_DIR}`: the directory prebuilt image pack extracted to

e.g. `~/U221LIV1050_quark_2015-05-22`

`${BSP_PACK}`: BSP pack

e.g. `U221LBV1050_2015-05-22.zip`

`${BSP_HOME}`: the directory BSP pack extracted to

e.g. `~/LBV1050`

`${BDIR}`: build directory

e.g. `yocto_build`

`${SD_MOUNT}`: mount point of SD card in Ubuntu

e.g. `/media/sdf1`

`${POKY}`: Yocto poky version

e.g. `1.4.2`

debug console / serial console

> serial terminal program (e.g. minicom, putty, teraterm) that serial port is configured to 115200 8N1

terminal console

> terminal program (e.g. gnome-terminal, xfce4-terminal)

3.1.1.3 Introducing the BSP

The BSP is based on Yocto Project with Intel enhanced features for Quark, plus specific target board features from Advantech Inc.

Naming Rule

The BSP/prebuilt image pack name is consist of the model name followed by "LB" or "LI" plus version number and released date.

For example, U221LBV1050_2015-05-22.zip which "U221" stands for UBC-221, "LB" is acronym of Linux BSP, "V1050" stands for Version 1.050.

For example, U221LIV1050_quark_2015-05-22.zip which "LI" is acronym for prebuilt Linux Image.

BSP pack

Unpack BSP pack to home directory by performing the following command:

```
$ unzip ${BSP_PACK} -d ~/
```


The description of some important folders list below:

> **sources/**
>> **meta-advantech/**: meta layer by Advantech
>> **meta-intel/**: meta layer by Intel
>> **meta-clanton-*/**: meta layer by Intel
> **setup.sh**: to create one new build environment

Prebuilt image pack

Perform the following command to unpack prebuilt-image-pack to home directory.

```
$ unzip ${PREBUILT_IMAGE_PACK} -d ~/
```

Prepare one FAT32 formatted SD card, and mount it to mount point.

```
$ cp -a ${PREBUILT_IMAGE_DIR}/sdcard/* ${SD_MOUNT}/
```

3.1.1.4 Build Instructions

To create a new build environment

Perform the following commands in terminal console

```
$ cd ${BSP_HOME}/meta-clanton_v1.0.4/
$ ./setup.sh
$ source poky/oe-init-build-env yocto_build
```

To continue an existing build environment

Perform the following commands in terminal console

```
$ cd ${BSP_HOME}/meta-clanton_v1.0.4/
$ source poky/oe-init-build-env yocto_build
```

To build all image files

1. To create/continue a build environment\
2. Perform the following commands in the terminal console
```
$ bitbake image-full
```
3. The following files will be located in directory "./tmp/deploy/images/" while build-ing process finished successfully.
```
boot/grub/grub.conf
bzImage
core-image-minimal-initramfs-clanton.cpio.gz
grub.efi
image-full-clanton.ext3
```

To build a toolchain installer

1. To create/continue a build environment
2. Perform the following command in the terminal console
```
$ bitbake image-full -c populate_sdk
```
3. The installer, clanton-tiny-uclibc-x86_64-i586-toolchain-${POKY}.sh, will be located in the directory "./tmp/deploy/sdk/".

To build grub

1. To create/continue a build environment
2. Perform the following command in the terminal console
```
$ bitbake grub
```
3. The file, grub.efi, will be located in directory "./tmp/deploy/images/".

To build linux kernel

1. To create/continue a build environment
2. Perform the following command in the terminal console
```
A.to show up menuconfig
   $ bitbake linux-yocto-clanton -c menuconfig
B.to do build
   $ bitbake linux-yocto-clanton
```
3. The files, bzImage, will be located in directory "./tmp/deploy/images/".

To build initramfs

1. To create/continue a build environment
2. Perform the following command in terminal console

   ```
   $ bitbake core-image-minimal-initramfs
   ```
3. The file, core-image-minimal-initramfs-clanton.cpio.gz, will be located in directory "./tmp/deploy/images/".

3.1.2 Debug Port Setting

UBC-221 can communicate with a host server (Windows or Linux) by using serial cables. Common serial communication programs such as HyperTerminal, Tera Term or PuTTY can be used in this case. The example as below describes the serial terminal setup using HyperTerminal on a Windows host:

1. Connect UBC-221 with your Windows PC by using a debug cable. (optional accessory, 1700021565-01)
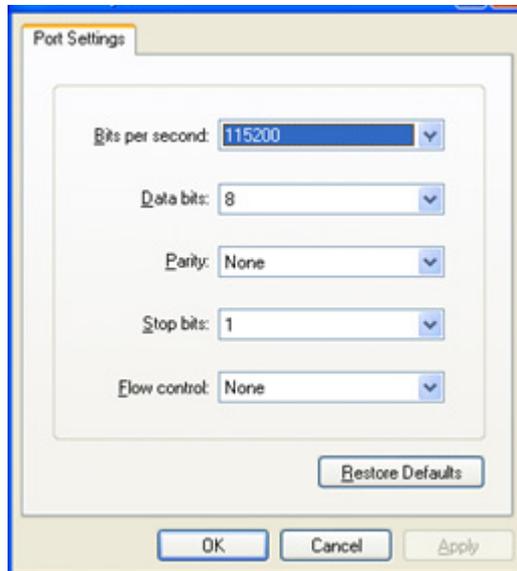2. Open HyperTerminal on your Windows PC, and select the settings as shown in Figure 3.1.

Figure 3.1 Debug port setting

3. After the bootloader is programmed on the SD card, plug in the power cord to power up UBC-221. The bootloader prompt will be displayed on the terminal screen.

3.1.3 Customization

3.1.3.1 Setting up SDK

1. Please follow the steps below to build a toolchain installer.
2. Perform the following command in the terminal console:

```
$ cd ${BSP_HOME}/${BDIR}/tmp/deploy/sdk
$ sudo ./clanton-tiny-uclibc-x86_64-i586-toolchain-${POKY}.sh
```

3. Enter directory or press Enter when the following question appears:

```
Enter target directory for SDK (default: /opt/clanton-tiny/1.4.2):
```

4. Just press Enter when the following question shows up:

```
You are about to install the SDK to "/opt/clanton-tiny/1.4.2". Proceed[Y/n]?
```

5. When the following message shows up it means the SDK is ready.

```
Extracting SDK...done
Setting it up...done
SDK has been successfully set up and is ready to be used.
```

3.1.3.2 Setting up a cross compiling environment

1. SDK has been set up. (ref. 2.2)
2. Perform the following command in the terminal console

```
$ source /opt/clanton-tiny/${POKY}/environment-setup-i586-poky-linux-uclibc
```

3.2 Test tools

All test tools must be verified on UBC-221, please prepare the required test fixtures before verifying each specified I/O. If you have any problems getting the test fixture, please contact your Advantech contact window for help.

3.2.1 GPIO

```
# echo 0 > /sys/class/gpio/export
# echo 1 > /sys/class/gpio/export
# echo 2 > /sys/class/gpio/export
# echo 3 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio0/direction
# echo "out" > /sys/class/gpio/gpio1/direction
# echo "in" > /sys/class/gpio/gpio2/direction
# echo "in" > /sys/class/gpio/gpio3/direction
# grep "" /sys/class/gpio/gpio{0..3}/direction
```

3.2.1.1 Connecting #0 and #3

```
# echo 0 > /sys/class/gpio/gpio0/value
# grep ""  /sys/class/gpio/gpio{0,3}/value
```

```
# grep "" /sys/class/gpio/gpio{0..3}/direction
/sys/class/gpio/gpio0/direction:out
/sys/class/gpio/gpio1/direction:out
/sys/class/gpio/gpio2/direction:in
/sys/class/gpio/gpio3/direction:in
```

```
# echo 1 > /sys/class/gpio/gpio0/value
# grep ""  /sys/class/gpio/gpio{0,3}/value
```

```
# echo 0 > /sys/class/gpio/gpio0/value
# grep "" /sys/class/gpio/gpio{0,3}/value
/sys/class/gpio/gpio0/value:0
/sys/class/gpio/gpio3/value:0
```

3.2.1.2 Connecting #1 and #2

```
# echo 0 > /sys/class/gpio/gpio1/value
# grep "" /sys/class/gpio/gpio{1,2}/value
```

```
# echo 0 > /sys/class/gpio/gpio1/value
# grep "" /sys/class/gpio/gpio{1,2}/value
/sys/class/gpio/gpio1/value:0
/sys/class/gpio/gpio2/value:0
```

```
# echo 1 > /sys/class/gpio/gpio1/value
# grep "" /sys/class/gpio/gpio{1,2}/value
```

```
# echo 1 > /sys/class/gpio/gpio1/value
# grep "" /sys/class/gpio/gpio{1,2}/value
/sys/class/gpio/gpio1/value:1
/sys/class/gpio/gpio2/value:1
```

3.2.2 UART

```
# stty -F /dev/ttyS0 -echo
# cat /dev/ttyS0 &
# echo "1234567890" > /dev/ttyS0
```

3.2.2.1 Connecting #Tx and #Rx

```
# echo "1234567890" > /dev/ttyS0
```

```
# stty -F /dev/ttyS0 -echo
# cat /dev/ttyS0 &
[1] 1318
# echo "1234567890" > /dev/ttyS0
#
# #Connecting #Tx with #Rx
# echo "1234567890" > /dev/ttyS0
# 1234567890
```

3.2.3 LED

```
# echo 15 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio15/direction
```

3.2.3.1 LED on

```
# echo 1 > /sys/class/gpio/gpio15/value
```

3.2.3.2 LED off

```
# echo 0 > /sys/class/gpio/gpio15/value
```

```
# echo 15 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio15/direction
# #LED on
# echo 1 > /sys/class/gpio/gpio15/value
# #LED off
# echo 0 > /sys/class/gpio/gpio15/value
```

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3.2.4 Wifi

Using Intel wifi card for example:
Intel Centrino Wireless-N 135
Model:135BNHMW

Set wifi ssid to environment variable, SSID.
Set wifi password to environment variable, PSWD.

```
# ifconfig wlan0 up
# wpa_passphrase $SSID $PSWD > /tmp/wpa.conf
# wpa_supplicant -BDwext -iwlan0 -c/tmp/wpa.conf
# udhcpc -b -i wlan0
# ifconfig
# ping tw.yahoo.com
```

```
wlan0      Link encap:Ethernet  HWaddr 0C:D2:92:57:DA:23
           inet addr:192.168.1.57  Bcast:0.0.0.0  Mask:255.255.255.0
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:17 errors:0 dropped:0 overruns:0 frame:0
           TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:2648 (2.5 KiB)  TX bytes:1572 (1.5 KiB)

# ping tw.yahoo.com
PING tw.yahoo.com (116.214.12.74): 56 data bytes
64 bytes from 116.214.12.74: seq=0 ttl=52 time=3.425 ms
64 bytes from 116.214.12.74: seq=1 ttl=52 time=3.359 ms
64 bytes from 116.214.12.74: seq=2 ttl=52 time=3.312 ms
```

3.2.5 LAN eth0

Make sure the DHCP service works in the connected LAN.

Remove network connection from both of the two LAN ports.

```
# ifconfig eth1 down
# ifconfig eth0 up
# ifconfig
```

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:322 (322.0 B)
          Interrupt:40 Base address:0x4000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Plug the network cable into the LAN port eth0 and wait for the "eth0: link to show up.

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:322 (322.0 B)
          Interrupt:40 Base address:0x8000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

# [  104.140198] libphy: stmmac-1:01 - Link is Up - 100/Full
[  104.145653] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

Checking if there is an IP or not.

```
# ifconfig
```

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          inet addr:172.22.12.217  Bcast:172.22.15.255  Mask:255.255.252.(
          inet6 addr: fe80::213:20ff:fefd:f4f2/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4378 errors:0 dropped:1052 overruns:0 frame:0
          TX packets:40 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:401042 (391.6 KiB)  TX bytes:4243 (4.1 KiB)
          Interrupt:40 Base address:0x8000
```

If there is no IP, please check the network connection and DHCP service.

If there is an IP, that means the network is working.

Use Ping to test network connection again.

```
# ping 172.22.15.145
PING 172.22.15.145 (172.22.15.145): 56 data bytes
64 bytes from 172.22.15.145: seq=0 ttl=64 time=2.404 ms
64 bytes from 172.22.15.145: seq=1 ttl=64 time=1.194 ms
64 bytes from 172.22.15.145: seq=2 ttl=64 time=1.385 ms
64 bytes from 172.22.15.145: seq=3 ttl=64 time=1.353 ms
64 bytes from 172.22.15.145: seq=4 ttl=64 time=1.392 ms
^C
--- 172.22.15.145 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.194/1.545/2.404 ms
```

3.2.6 LAN eth1

Make sure the DHCP service works in the connected LAN.Remove network connection from both of the two LAN ports.

```
# ifconfig eth0 down
# ifconfig eth1 up
# ifconfig
```

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:938 (938.0 B)
          Interrupt:41 Base address:0xc000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Plug the network cable into LAN port eth1 and wait for "eth1: link to become ready" and show up.

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:938 (938.0 B)
          Interrupt:41 Base address:0xc000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

# [  484.590197] libphy: stmmac-2:01 - Link is Up - 100/Full
[  484.595641] IPv6: ADDRCONF(NETDEV_CHANGE): eth1: link becomes ready
```

Check if there is an IP or not.

```
# ifconfig
```

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          inet addr:172.22.12.251  Bcast:172.22.15.255  Mask:255.255.252.0
          inet6 addr: fe80::ff:ffff:feff:ff01/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:7232 errors:0 dropped:1598 overruns:0 frame:0
          TX packets:51 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:655315 (639.9 KiB)  TX bytes:5179 (5.0 KiB)
          Interrupt:41 Base address:0xc000
```

If there is no IP, check the network connection and DHCP service.

If there is one IP, that means the network is working.

Use ping to test the network connection again.

```
# ping 172.22.15.145
PING 172.22.15.145 (172.22.15.145): 56 data bytes
64 bytes from 172.22.15.145: seq=0 ttl=64 time=2.623 ms
64 bytes from 172.22.15.145: seq=1 ttl=64 time=1.392 ms
64 bytes from 172.22.15.145: seq=2 ttl=64 time=1.354 ms
64 bytes from 172.22.15.145: seq=3 ttl=64 time=1.258 ms
```

3.2.7 USB

Remove any USB devices. Plug in one USB storage device with filesystem (fat32,ext2 or ext3). The following message will show up and the file system will be mounted automatically.

```
# df
Filesystem           1K-blocks      Used Available Use% Mounted on
rootfs                  302183    144136    142687  50% /
none                    247980         4    247976   0% /dev
/dev/mmcblk0p1         7838720    311328   7527392   4% /media/realroot
/dev/loop0              302183    144136    142687  50% /
/dev/mmcblk0p1         7838720    311328   7527392   4% /media/mmcblk0p1
tmpfs                   248960       124    248836   0% /var/volatile
tmpfs                   248960         0    248960   0% /media/ram
# [ 2079.780169] usb 2-1: new high-speed USB device number 5 using ehci-pci
[ 2080.150243] usb-storage 2-1:1.0: Quirks match for vid 058f pid 6387: 400
[ 2080.158994] scsi3 : usb-storage 2-1:1.0
[ 2081.182893] scsi 3:0:0:0: Direct-Access     JetFlash TS1GJFV30        8.07 PQ: 0 ANSI: 2
[ 2081.211808] sd 3:0:0:0: [sda] 1986558 512-byte logical blocks: (1.01 GB/969 MiB)
[ 2081.235436] sd 3:0:0:0: Attached scsi generic sg0 type 0
[ 2081.249283] sd 3:0:0:0: [sda] Write Protect is off
[ 2081.259179] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.264830] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.287804] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.293467] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.304938]  sda: sda1
[ 2081.326570] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.332234] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.338391] sd 3:0:0:0: [sda] Attached SCSI removable disk
```

df

```
# df
Filesystem           1K-blocks      Used Available Use% Mounted on
rootfs                  302183    144137    142686  50% /
none                    247980         4    247976   0% /dev
/dev/mmcblk0p1         7838720    311328   7527392   4% /media/realroot
/dev/loop0              302183    144137    142686  50% /
/dev/mmcblk0p1         7838720    311328   7527392   4% /media/mmcblk0p1
tmpfs                   248960       124    248836   0% /var/volatile
tmpfs                   248960         0    248960   0% /media/ram
/dev/sda1               989148     74148    915000   7% /media/sda1
```

Unmount the USB storage device.

umount /media/sda1

3.2.8 3G

```
# ifconfig eth0 down
# ifconfig eth1 down
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CON-
NECT" ""' user username password password /dev/ttyUSB2 460800
nodetach crtscts debug usepeerdns defaultroute &
```

```
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""' user username password password /dev/
ttyUSB2 460800 nodetach crtscts debug usepeerdns defaultroute &
[1] 1325
# send (AT^M)
send (ATDT*99#^M)
expect (CONNECT)
AT^M^M
OK^M
ATDT*99#^M^M
CONNECT
 -- got it

send (^M)
Script chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" "" finished (pid 1326), status = 0x0
Serial connection established.
using channel 2
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB2
```

```
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0x8a436f3c> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x3 <asyncmap 0x0> <auth chap MD5> <magic 0x1043349> <pcomp> <accomp>]
sent [LCP ConfAck id=0x3 <asyncmap 0x0> <auth chap MD5> <magic 0x1043349> <pcomp> <accomp>]
rcvd [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0x8a436f3c> <pcomp> <accomp>]
rcvd [LCP DiscReq id=0x4 magic=0x1043349]
rcvd [CHAP Challenge id=0x1 <6cd09e243c7585361ad2d3735ee48657>, name = "UMTS_CHAP_SRVR"]
sent [CHAP Response id=0x1 <606d8283832332d22b1503fc4408b650>, name = "username"]
rcvd [CHAP Success id=0x1 ""]
CHAP authentication succeeded
CHAP authentication succeeded
sent [CCP ConfReq id=0x1 <deflate 15> <deflate(old#) 15> <bsd v1 15>]
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [LCP ProtRej id=0x5 80 fd 01 01 00 0f 1a 04 78 00 18 04 78 00 15 03 2f]
Protocol-Reject for 'Compression Control Protocol' (0x80fd) received
rcvd [IPCP ConfNak id=0x1 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11
.12.14>]
sent [IPCP ConfReq id=0x2 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <
ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfNak id=0x2 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11
.12.14>]
sent [IPCP ConfReq id=0x3 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <
ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfNak id=0x3 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11
.12.14>]
sent [IPCP ConfReq id=0x4 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <
ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfReq id=0x2]
sent [IPCP ConfNak id=0x2 <addr 0.0.0.0>]
rcvd [IPCP ConfRej id=0x4 <compress VJ 0f 01> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
sent [IPCP ConfReq id=0x5 <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14>]
rcvd [IPCP ConfReq id=0x3]
sent [IPCP ConfAck id=0x3]
rcvd [IPCP ConfNak id=0x5 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
sent [IPCP ConfReq id=0x6 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
rcvd [IPCP ConfAck id=0x6 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
Could not determine remote IP address: defaulting to 10.64.64.64
not replacing default route to eth1 [172.22.15.254]
local  IP address 100.67.33.244
remote IP address 10.64.64.64
primary   DNS address 168.95.1.1
secondary DNS address 168.95.192.1
Script /etc/ppp/ip-up started (pid 1329)
Script /etc/ppp/ip-up finished (pid 1329), status = 0x0
```

Checking if DNS is ready.

```
# cat /etc/resolv.conf
```

```
# cat /etc/resolv.conf
nameserver 168.95.1.1
nameserver 168.95.192.1
```

Testing if the WiFi connection works or not.

```
# ping www.google.com
```

```
# ping www.google.com
PING www.google.com (64.233.189.99): 56 data bytes
64 bytes from 64.233.189.99: seq=0 ttl=45 time=6.137 ms
64 bytes from 64.233.189.99: seq=1 ttl=45 time=6.123 ms
64 bytes from 64.233.189.99: seq=2 ttl=45 time=6.115 ms
64 bytes from 64.233.189.99: seq=3 ttl=45 time=7.106 ms
64 bytes from 64.233.189.99: seq=4 ttl=45 time=6.155 ms
^C
--- www.google.com ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 6.115/6.327/7.106 ms
```

Chapter 4

Advantech Services

This chapter introduces Advantech design in serviceability, technical support and warranty policy.

4.1 Contact Information

Below is the contact information for Advantech customer service.

Region/Country	Contact Information
America	1-888-576-9688
Brazil	0800-770-5355
Mexico	01-800-467-2415
Europe (Toll Free)	00800-2426-8080
Singapore & SAP	65-64421000
Malaysia	1800-88-1809
Australia (Toll Free)	1300-308-531
China (Toll Free)	800-810-0345 800-810-8389 Sales@advantech.com.cn
India (Toll Free)	1-800-425-5071
Japan (Toll Free)	0800-500-1055
Korea (Toll Free)	080-363-9494 080-363-9495
Taiwan (Toll Free)	0800-777-111
Russia (Toll Free)	8-800-555-01-50

You can also reach our service team through the below website, our technical support engineer will provide quick response once the form is filled out:

http://www.advantech.com.tw/contact/default.aspx?page=contact_form2&subject=Technical+Support

4.2 Technical Support and Assistance

For more information about this and other Advantech products, please visit our website at:

<http://www.advantech.com/>

<http://www.advantech.com/ePlatform/>

For technical support and service, please visit our support website at:

<http://support.advantech.com.tw/support/>

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer Service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

4.3 Global Service Policy

4.3.1 Warranty Policy

Below is the warranty policy of Advantech products:

4.3.2 Warranty Period

Advantech branded off-the-shelf products and 3rd party off-the-shelf products used to assemble Advantech Configure to Order products are entitled to a 2 years complete and prompt global warranty service. Product defect in design, materials, and work-manship, are covered from the date of shipment.

All customized products will by default carry a 15 months regional warranty service. The actual product warranty terms and conditions may vary based on sales contract.

All 3rd party products purchased separately will be covered by the original manufac-turer's warranty and time period, and shall not exceed one year of coverage through Advantech.

4.3.3 Repairs under Warranty

It is possible to obtain a replacement (Cross-Shipment) during the first 30 days of the purchase, thru your original ADVANTECH supplier to arrange DOA replacement if the products were purchased directly from ADVANTECH and the product is DOA (Dead-on-Arrival). The DOA Cross-Shipment excludes any shipping damage, cus-tomized and/or build-to-order products.

For those products which are not DOA, the return fee to an authorized ADVANTECH repair facility will be at the customers' expense. The shipping fee for reconstructive products from ADVANTECH back to customers' sites will be at ADVANTECH's expense.

4.3.4 Exclusions from Warranty

The product is excluded from warranty if

■ The product has been found to be defective after expiry of the warranty period.

■ Warranty has been voided by removal or alternation of product or part identifi-cation labels.

■ The product has been misused, abused, or subjected to unauthorized disas-sembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause. Such conditions will be determined by ADVANTECH at its sole unfettered discretion.

■ The product is damaged beyond repair due to a natural disaster such as a light-ing strike, flood, earthquake, etc.

■ Product updates/upgrades and tests upon the request of customers who are without warranty.

4.4 Repair Process

4.4.1 Obtaining an RMA Number

All returns from customers must be authorized with an ADVANTECH RMA (Return Merchandise Authorization) number. Any returns of defective units or parts without valid RMA numbers will not be accepted; they will be returned to the customer at the customer's cost without prior notice.

An RMA number is only an authorization for returning a product; it is not an approval for repair or replacement. When requesting an RMA number, please access ADVANTECH's RMA web site: http://erma.ADVANTECH.com.tw with an authorized user ID and password.

You must fill out basic product and customer information and describe the problems encountered in detail in "Problem Description". Vague entries such as "does not work" and "failure" are not acceptable.

If you are uncertain about the cause of the problem, please contact ADVANTECH's Application Engineers (AE). They may be able to find a solution that does not require sending the product for repair.

The serial number of the whole set is required if only a key defective part is returned for repair. Otherwise, the case will be regarded as out-of-warranty.

4.4.2 Returning the Product for Repair

It's possible customers can save time and meet end-user requirements by returning defective products to an authorized ADVANTECH repair facility without an extra cross-region charge. It is required to contact the local repair center before offering global repair service.

It is recommended to send cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as CPU, DRAM and CF Card. If you send all these parts back (because you believe they may be part of the problem), please note clearly that they are included. Otherwise, ADVANTECH is not responsible for any items not listed. Make sure the "Problem Description" is enclosed.

European Customers that are located outside European Community are requested to use UPS as the forwarding company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to decrease goods clearance time:

1. Give a low value to the product on the invoice, or additional charges will be levied by customs that will be borne by the sender.
2. Add information "Invoice for customs purposes only with no commercial value" on the shipment invoice.
3. Show RMA numbers, product serial numbers and warranty status on the shipment invoice.
4. Add information about country of origin of goods

In addition, please attach an invoice with RMA number to the carton, then write the RMA number on the outside of the carton and attach the packing slip to save handling time. Please also address the parts directly to the Service Department and mark the package "Attn. RMA Service Department".

All products must be returned in properly packed ESD material or anti-static bags. ADVANTECH reserves the right to return unrepaired items at the customer's cost if inappropriately packed.

Besides that, "Door-to-Door" transportation such as speed post is recommended for delivery, otherwise, the sender should bear additional charges such as clearance fees if Air-Cargo is adopted.

Should DOA cases fail, ADVANTECH will take full responsibility for the product and transportation charges. If the items are not DOA, but fail within warranty, the sender will bear the freight charges. For out-of-warranty cases, customers must cover the cost and take care of both outward and inward transportation.

4.4.3 Service Charges

The product is excluded from warranty if:

- The product is repaired after expiry of the warranty period.
- The product is tested or calibrated after expiry of the warranty period, and a No Problem Found (NPF) result is obtained.
- The product, though repaired within the warranty period, has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause. Such conditions will be determined by ADVANTECH at its sole unfettered discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting strike, flood, earthquake, etc.
- Product updates and tests upon the request of customers who are without warranty.

If a product has been repaired by ADVANTECH, and within three months after such a repair the product requires another repair for the same problem, ADVANTECH will do this repair free of charge. However, such free repairs do not apply to products which have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause.

Please contact your nearest regional service center for detail service quotation.

Before we start out-of-warranty repairs, we will send you a pro forma invoice (P/I) with the repair charges. When you remit the funds, please reference the P/I number listed under "Our Ref". ADVANTECH reserves the right to deny repair services to customers that do not return the DOA unit or sign the P/I. Meanwhile, ADVANTECH will scrap defective products without prior notice if customers do not return the signed P/I within 3 months.

4.4.4 Repair Report

ADVANTECH returns each product with a "Repair Report" which shows the result of the repair. A "Repair Analysis Report" is also provided to customers upon request. If the defect is not caused by ADVANTECH design or manufacturing, customers will be charged US$60 or US$120 for in-warranty or out-of-warranty repair analysis reports respectively.

4.4.5 Custody of Products Submitted for Repair

ADVANTECH will retain custody of a product submitted for repair for one month while it is waiting for return of a signed P/I or payment (A/R). If the customer fails to respond within such period, ADVANTECH will close the case automatically. ADVANTECH will take reasonable measures to stay in proper contact with the customer during this one month period.

4.4.6 Shipping Back to the Customer

The forwarding company for RMA returns from ADVANTECH to customers is selected by ADVANTECH. Per customer requirement, other express services can be adopted, such as UPS, FedEx and etc. The customer must bear the extra costs of such alternative shipment. If you require any special arrangements, please indicate this when shipping the product to us.

ADVANTECH

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