



networks@work

HARDWARE MANUAL



COMPEX SYSTEMS

WP54 6E

RoHS-compliant

Revision: 1.9



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REVISION HISTORY

Revision	Information / Changes
Rev 1.1	First release for WP54 6E/ WP54 WRT6E BareBoard
Rev 1.2	Added 1 point to “Additional Notes”
Rev 1.3	Revert to using Compex Loader Version 2.40 to load Open-WRT.
Rev 1.4	WP54 6E / WP54 WRT 6E becomes WP54 6E. There is no longer any difference between these 2 versions. The CPLD security chip is removed. Added “Reasons for Using Development Kit” and “Ordering Configurations”
Rev 1.5	Added Precaution for Serial Converter
Rev 1.6	Added “How to Port Your Own Firmware over to WP54 6E”
Rev 1.7	Added “How to Port OpenWRT Firmware over to WP54 6E”
Rev 1.8	Change the Open-WRT version from revision 7068 to revision 7118
Rev 1.9	Added “How to Extend the Antenna Alignment to Case LED”



REASONS USING DEVELOPMENT KIT

The Development Kit is especially useful for customers who are developing their firmware. Below are the reasons how we have made it more user-friendly for you.

PURPOSE	WHY IS DEVELOPMENT KIT USEFUL?
Develop Open-WRT on WP54	Serial Converter can be used to debug the Open-WRT firmware.
Port Own Firmware Over to WP54	Serial Converter can be used to debug the Serial Output messages.
Port Own Firmware and Loader Over to WP54	Serial Converter can be used to debug the Serial Output messages. JTAG Programmer can be used to load in your loader.

Ordering Options - Standard Configurations*

ORDER CODE	CONTENTS
P-C5 OEMWP546E	<ul style="list-style-type: none">WP54 6E Bare-board (Pre-Loaded with Complex Firmware)
WP54AG 6E DEV KIT	<ul style="list-style-type: none">WP54 6E Bareboard (Pre-loaded with Complex Firmware)Wireless AG mini-PCI (Complex WLM54AG)PoE+ Injector (Complex PoE+1A4815)JTAG Programmer (Cable from PC to JTAG Programmer included)Serial Converter (Cable from PC to Serial Converter included)24V DC Power Supply

* Configurations are subjected to change without notice

PORTING OpenWRT FIRMWARE OVER TO WP54 6E

Guide on how to port OpenWRT Firmware over to WP54

Note

1. Your current Compex loader version is V2.4 or above.
2. Please ensure that Ethernet connection is connected and able to Ping address = 192.168.168.1 .
3. You are in the firmware upgrade mode
==> (By Press and hold the Reset button and plug-in the power adaptor).

Console (CMD/DOS) type command below.

1. Write OpenWrt image to flash.
 - > tftp -i 192.168.168.1 put flashwrt.cmd
 - > tftp -i 192.168.168.1 put openwrt-wp54g-2.4-squashfs.trx
(This might takes Up to 1 Minute, So please wait for awhile)
2. Change the partition table to load OpenWrt image format.
 - > tftp -i 192.168.168.1 put partwrt.cmd
3. Create a default NVRAM partition.
 - > tftp -i 192.168.168.1 put nvram-crt.cmd
4. Finish and Reboot the AP.
5. To test whether you are successful, in converting to Open-WRT,
Please do followings command in DOS
> telnet 192.168.1.1
 - a. The picture shows below will appear if you are successful.
 - b. The first boot time will be a little longer, so please wait for awhile.

WIRELESS FREEDOM

KAMIKAZE (bleeding edge, r5636) -----

- * 10 oz Vodka Shake well with ice and strain
- * 10 oz Triple sec mixture into 10 shot glasses.
- * 10 oz lime juice Salute!

```
|root@OpenWrt:/#
```

=End=

Alternatively you might also use Autoconvert file that will automatically upload you file one by one without need to type it to avoid sequence error.

1. Go to the loader mode (Press and hold the reset button and press Power up the device).
2. from the folder, Run "Autoconvert.bat"
3. Follow the steps and the command show in the Console (CMD/DOS form).
4. It takes up to 2 minute for entire Process.
5. To test whether you are successful in converting to Open-WRT,

Please do the followings command in DOS

```
> telnet 192.168.1.1
```

- a. The picture shows above will appear if you are successful.
b. If you can't see the picture above, u can reboot the device and reinstall it.

PORTING OWN FIRMWARE OVER TO WP54 6E

To port over your own firmware over to WP54 6E, you will need to have the drivers to support the boards and also some image generating tool to help to generate the header for your firmware to be ported over to our platform. This process is appropriate for customers using Complex Loader.

Drivers to Support the boards

1. Go to Open-WRT website (<http://openwrt.org/>)
2. Click "Development" to arrive at <https://dev.openwrt.org/>. The documentation to download the drivers needed for WP54 6E board or WP18 board is all there.
3. On the Linux platform, use "svn co -r 7118 <https://svn.openwrt.org/openwrt/trunk/>"
4. Untar wp54-mod.tgz (Please contact support@complex.com.sg to get this file) and put the files under the trunk folder you have uploaded.
5. After "make menuconfig", change the target to ADM5120 for WP54 and Intel XScale IXP4XX for WP18. You will get a kernel and a root file system that can work with our board. Alternatively, you can use the wp54.config (in the wp54-mod.tgz) and copy it to .config
6. Port your firmware over to the root file system.

Generating a firmware compatible with Complex Loader

1. Go to the URL "<https://dev.openwrt.org/browser/trunk/tools/firmware-utils/src/mkmylofw.c>"
2. Follow the instructions to generate a firmware compatible with Complex Loader.

CONFIGURATION AND INSTALLATION (WP54 6E)

The following is the GPIO Bit mapping specific to the Complex WP54 6E.

GPIO Bit Mapping

The Complex WP54 6E GPIO bit mapping is shown below.

GPIO Bit	Description
0	Not Used (CPLD)
LED22	Not Used (CPLD)
LED32	Not Used (CPLD)
LED41	Not Used (CPLD)
1	Temperature Sensor / Voltage Sensor (DS2438) (Optional for Board)
2	Output, LED (Diagnostic)
3	Output, System Reset (CPU Reset)
4	Input, Reset Button
5	Output, Flash A20 Control
6	Output, LED(WLAN)
7	Output, LED(LAN)



Interface Connectors

The Compex WP54 6E interface connector pin assignments and signal descriptions are included in the following sections. The connectors are listed in the section below and the connector locations are shown in the following diagrams.

<u>Connector</u>	<u>Function</u>
J0	Power Jack
U10/U12	Ethernet Ports
JP1	JTAG Port
JU7_2	CPLD Pin Header
J3	MiniPCI Slot
J1	Serial Port
SW1	Reset Button

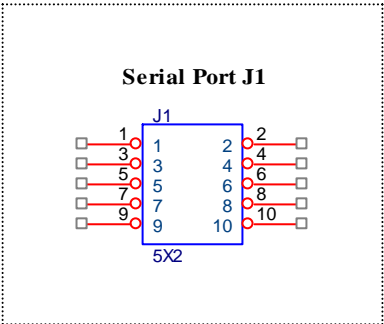
Serial Port Header

The Compex WP54 6E Serial Port (J1) Header signaling is shown in the following table.

<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
1	VCC – 3.3V	2	DTR – Data Terminal Ready
3	UART 0 Transmit Data	4	DSR – Data Set Ready
5	UART 0 Receive Data	6	DCD – Data Carrier Detect
7	GND	8	UART 1 Receive Data
9	UART 1 Transmit Data	10	GND

Note:

Our Serial port Implementation requires an external high-impedance serial port not usually available with the serial ports of the notebooks/computers. You will need a Serial Converter available in the market. For our customers’ convenience, it is bundled together with the Compex WP54 Development Kit.



Serial Console Settings

The serial console settings used together with the serial port is given below. This serial port uses TTL signals, and therefore you have to use serial converter using MAX-211 IC (or other IC in the market that convert TTL signals to RS232 signals) in order to use it with the PC.

Baud Rate	115200
Data	8 Bit
Parity	None
Stop	1 Bit
Flow Control	None

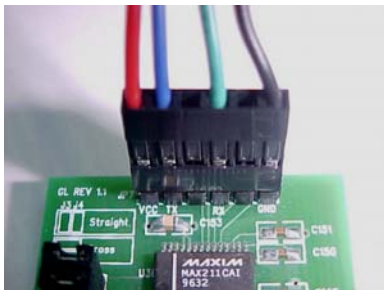
Precaution when using Serial Converter

Please attach the serial converter first on the board serial header, before attaching the power supply. This is to ensure that there is no surge of power to the serial converter, and prevent any damage the chipset on the serial converter.

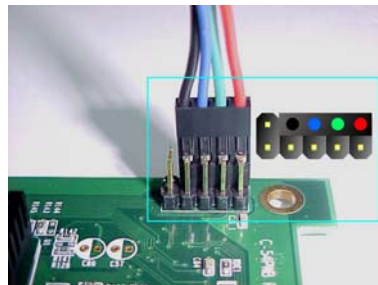
Serial Converter Pin Layouts

Cables on the serial converters are provided. You can use the 6 Pin (Fixed) to 4 Pin (Fixed) provided. The pin layouts of the serial converters for use with the WP54 6E are as follows:

Pin Assignment (Serial Converters)	Signal (Serial Converters)	Connected to Pin on WP54	Signal (WP54)
Pin 1	VCC(3.3V) – Red	Pin 1	VCC (3.3V)
Pin 2	TX – Blue	Pin 5	RX
Pin 4	RX - Green	Pin 3	TX
Pin 6	GND – Black	Pin 7	GND



Arrangement of Cables on Serial Converter to WP54



Arrangement of Cables on WP54.

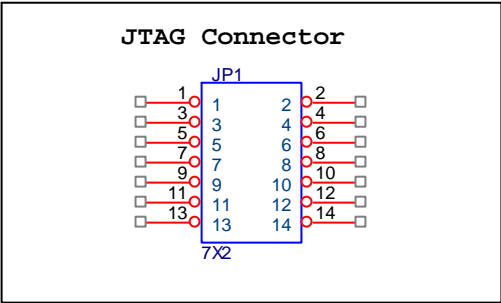
JTAG Port Header

The primary purpose of the Compex WP54 6E JTAG Port Header is to facilitate program download into Flash memory.

<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
1	TRST_N	2	GND
3	TDI	4	GND
5	TDO	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	RESET	12	NC
13	DINT	14	3V3

Note:

Compex has a JTAG Programmer compatible with WP54 6E. It is bundled with Compex WP54 Development Kit. This JTAG programmer is able to download file onto the Flash, and thus recover a corrupted loader.





Ethernet Connectors

The Compex WP54 6E contains 1 X 10/100 Base-TX Ethernet Channels. The Ethernet Channels are available through standard 8-pin RJ45 connectors. An additional Ethernet Channel is available on request.

Note: Only U10 support Power-over-Ethernet.

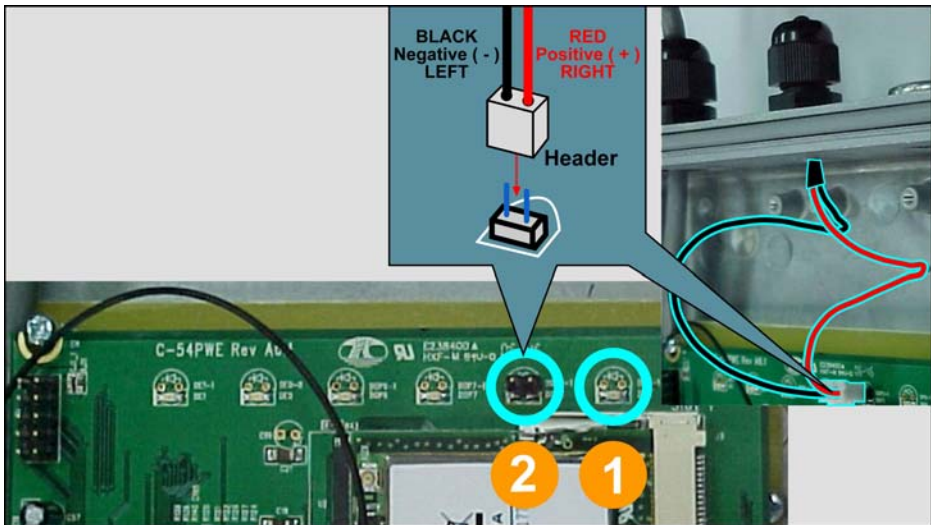
Ethernet Connectors signaling is shown below.

<u>Pin</u>	<u>Signal</u>
1	TX+
2	TX-
3	RX+
4	PoE+V
5	PoE+V
6	RX-
7	GND
8	GND

Ethernet Connector U10

How to Extend Antenna Alignment to Case LED

You might want to extend the Antenna Alignment LED to the LED of the case. You just need to do a simple extension.



1. Jumper Added on the 2nd LED from the right.
2. Attach a cable to the Antenna Alignment LED to extend to Case LED

Additional Notes (For WP54 6E)

1. Major difference between WP54 6E and WP54 1B are that
 - a. WP54 1B can only support 5V DC and 48V PoE. WP54 6E can support 12V to 48V DC and 15V to 48V PoE.
 - b. WP54 1B can only use DC Power when use the serial converter. WP54 6E can use both DC Power and the PoE when using the serial converter.
 - c. WP54 1B's both ports are PoE, but WP54 6E only has one port that is PoE.

2. Why do we need to use GPIO 5 to select the flash bank?

It is needed because the ADM5120 flash controller only supports 2MB flash space. A "0" on GPIO 5 selects the 1st 2MB of flash and a "1" selects the last 2MB flash.

3. Can we increase the flash size to 8MB?

No. ADMtek 5120 has a limitation of 4MB flash. If you are switching over from WRAP boards which is X86 based, after compilation, the codes recompiled to MIPS core is much smaller. Therefore you do not need such a huge space.

4. Can we do a software reset to the miniPCI slot?

No. The miniPCI slot reset line is connected directly to ADM5120's PCI_RESER pin. The software has no control over this output pin. This output is in sync with the CPU's system reset pin (RESET_N). The RESET_N is however controlled by GPIO 3. When the CPU sends GPIO 3 to low, the CPU will get reset, the PCI_RESET will get reset too. The timing of this RESET_N pin depends on how long the CPU will get reset, and thus controlled by hardware.

Additional Notes (For WP54 6E Using Open-WRT ONLY)

1. Our Open-WRT is based on the current development branch, Kamikaze.
2. Please download Open-WRT Source Codes from
http://compex.com.sg/home/OEM/Open_wrt.htm

3. The Open-WRT is based on Linux 2.4. OpenWRT using Linux 2.6 is currently being developed by Compex team. It is also actively being debugged by the Open-WRT forum. Compex is committed to support Open-WRT in anyway we can.
4. Default IP address for
 Port nearer the DC Supply is: 192.168.1.1
 Port nearer the Ethernet Ports is: 192.168.0.2
5. MAC Address is Compex MAC Address (00-80-48-XX-XX-XX).
6. Please refer to the Read ME-WP54.txt in /WP546E(Open-WRT) if you want to upload the Open-WRT Source codes.
7. Flash Memory Map:

Offset:

0x00000000	Compex Loader
0x00050000	TRX (Linux Kernel + Root FS)
0x00300000	JFFS
0x003F0000	NVRAM Partition

8. Is there any space available for the JFFS partition?

The JFFS partition is dynamic. If the TRX size is less than (0x300000 – 0x500000), it always start at 0x300000. However, when the TRX size is larger than (0x300000 – 0x500000), the JFFS partition is moved (in 0x10000 size increment) to be after the TRX file.

9. What can be the maximum size for TRX?

The maximum size for TRX is (0x3F0000 – 0x500000) = 3801088 bytes. If the TRX reaches maximum size, there is no JFFS partition

10. What is the use of the JFFS partition? Can we store configuration files if there is no JFFS partition?

Our current Open-WRT stores configuration files in writable JFFS partition, not in the NVRAM partition. Configuration cannot be saved if there is no JFFS partition, although it can still run using default configurations.

11. Please do note that ONLY when Compex Loader is V2.40 and above, then it can support the use of Open-WRT.
12. Please also note that if you have bought WP54G 6E, then you change back from Open-WRT to Compex firmware, the Compex firmware to be used must be a "G" version. It is the same for WP54AG 6E.