

Linksys WRT1900ac

The WRT1900ac is beginning to work well with the CC development release, and a new wifi driver has come from Marvel fixing a myriad of problems.

- **Latest Stable Release: RC3 - Recommended for most users.**
- Official OpenWRT support for the WRT1900ac started under *Chaos Calmer [CC]*
- Latest trunk image with a 3.18 kernel shows improvement in network performance
 - Many report problems with the nightly builds (*they are not stable*)

Latest Discussion

- Firmware for the WRT1900AC is evolving rapidly; there is good discussion of the current state of the firmware at:
 - Late April 2015 [<https://forum.openwrt.org/viewtopic.php?pid=274533#p274533>]
 - Late July 2015 [<https://forum.openwrt.org/viewtopic.php?id=50173&p=266>]

Current Issues (Trunk)

- WRT1900AC WiFi Bug Reports [<https://github.com/kaloz/mwlwifi/issues>]
 1. Wireless goes offline if only one client is left connected [<https://github.com/kaloz/mwlwifi/issues/20>]
 2. Router randomly halts after connect/disconnect to wireless AP [<https://github.com/kaloz/mwlwifi/issues/21>]
- WRT1900AC Bug Reports [<https://dev.openwrt.org>]

Firmware Images

- There are several sources for current builds of OpenWRT for the Linksys WRT1900AC.
 - *Some of these builds do not have the LuCI web GUI installed.* To install LuCI, ssh/telnet to the router and follow these directions: [LuCI Essentials](#)

RC3 (Recommended)

- *As of July 7, 2015, OpenWRT developers have released the third RC of CC.* We recommend and encourage the use of this release as we want to converge on a single base for the purpose of bug reporting and general stability improvements until the official release of CC. Downloads can be found here:

- WRT1900AC v1 [https://downloads.openwrt.org/chaos_calmer/15.05-rc3/mvebu/generic/openwrt-15.05-rc3-mvebu-armada-xp-linksys-mambasquashfs-factory.img]

- WRT1900AC v2 [https://downloads.openwrt.org/chaos_calmer/15.05-rc3/mvebu/generic/openwrt-15.05-rc3-mvebu-armada-385-linksys-cobrasquashfs-factory.img]

- WRT1200AC v1 [https://downloads.openwrt.org/chaos_calmer/15.05-rc3/mvebu/generic/openwrt-15.05-rc3-mvebu-armada-385-linksys-caiman-squashfs-factory.img]

- **Applicable to all RC builds:** If you receive dependency errors when installing pkgs, it's probably because your opkg.conf is pointing to the trunk repository. To correct this:

- `rm /etc/opkg.conf ; cp /rom/etc/opkg.conf /etc/opkg.conf ; opkg update`
`opkg install <pkg name>`

- *If you were able to install select packages from the wrong repository, you may have to manually remove and reinstall them via:*

- `opkg remove <pkg name>`

- *Official CC snapshot release from OpenWRT*: Trunk [<https://downloads.openwrt.org/snapshots/trunk/mvebu/generic/openwrt-mvebu-armada-xp-linksys-mamba-squashfs-factory.img>] (*This will always have the latest daily trunk build.*) Currently based on 3.18 kernel, it is a bare minimum build so you will have to use opkg to add LuCI and any other extra packages.
 - *Current state of the CC BuildBot* [<http://buildbot.OpenWRT.org:8010/builders/mvebu>]
- *Lifchacksback evolving snapshots of trunk* (both 3.18 and 4.0 kernel builds) Lifchacksback Testing CC [<http://tinyurl.com/Lifchacksback-Testing-CC>]
 - *I have taken down my images until the final release of CC is out, I suggest using RC3.*

Kaloz's Build

- *Kaloz's evolving snapshots of trunk*: (includes 4.0 kernel, incorporating latest bug fixes/features, LuCI, plus other packages) Kaloz's Build [<https://downloads.openwrt.org/people/kaloz/>]
 - *As of this writing (2015.07.25), due to last update being 4/23 on kernel 3.18.11, it is recommended to use RC3 from July 7*

Revert to Linksys

- *To revert to Linksys*: OEM Stock Firmware [<http://support.linksys.com/en-us/support/routers/WRT1900AC>].
 - *Choose Downloads -> Hardware Version -> download link under Firmware*
 - *As of this writing the latest firmware is -> flash to 1.1.10*
 - Older Firmware Linksys OEM 1.1.8 Image [http://www.protechs-online.com/downloads/FW_WRT1900AC_1.1.8.164461_prod.img]

*Chadster's MeWRT release of the old AA version MeWRT [<https://github.com/Chadster766/MeWRT>] This was based on Attitude Adjustment code, which is obsolete and not supported anymore by its maintainer. Do not use this build - any of the builds above supersede it. *Included only for historical interest*

Supported Versions

Version/ Model	Launch Date	S/N	OpenWrt Version Supported	Model Specific Notes
v1 - Mamba	2014-03	XXX10XXXXXXXXXX	Trunk 43773 (as of 2014-12-25)	Kernel 3.18 recommended (better SoC support compared to Chaos Calmer's 3.14 kernel)
v2 - Cobra	2015-04	XXX20XXXXXXXXXX	-	v2 requires its own build. Make sure you are using one labeled v2

Anything not included in model specific notes, or where a short comment couldn't be included on the notes.

WRT1900ac

- OEM Source Code [<http://support.linksys.com/en-us/gplcodecenter?gplsku=#WRT1900AC>]
- v1 vs v2 Identification [<https://community.linksys.com/t5/Wireless-Routers/WRT1900AC-V2/td-p/940588>]

WRT1200ac

- Has similar hardware and needs specific build: "Caiman"

Hardware

HW Version	SoC	Ram	Flash	Network	USB	Serial	JTag	eSata
v1	Marvell MV78230	256 MiB	128 MiB		1x2.0 1x3.0	Yes		Yes
v2	Marvell Armada 38X(?)	256 MiB	128 MiB		1x2.0 1x3.0	Yes(?)		Yes

Specs

- Hardware Specs [https://scontent.xx.fbcdn.net/hphotos-xf1/v/t1.0-9/11407211_1404208493241367_8209389710117473620_n.jpg?oh=3c5dc941cd5c0e8092a16b4958ecf1fa&oe=55FB1D89]

Ports

- Layout [<https://s3.amazonaws.com/Justin.Schuhmann/images/wrt1900ac+port+layout.png>]

Bootlog

OEM

OpenWRT

Flashing Firmware

- To update any of the above firmware builds, log into your WRT1900ac by opening a web browser, navigating to: 192.168.1.1
[<http://192.168.1.1>]
 - *Default password is admin*
 - *Always* update firmware using a **wired** [LAN] connection to your router, **NEVER** over WiFi.
 - *Failure to adhere to this substantially raises the probability you will brick your router*

You may want to save your old Linksys settings if you've changed any of them. You **can't** import them into OpenWRT, but will be able to restore them should you need to revert back to stock firmware. To backup the Linksys settings:

1. Select *Troubleshooting* on the left, then *Diagnostics*
 2. Under *Router Configuration*, look for *Restore Configuration*, and select *Backup*

Image Formats

- When flashing from Linksys firmware always use the "factory" image. Preserving settings should not affect OpenWRT at all in either of these cases, as OpenWRT does not use the `syscfg` partition for its settings the way Linksys does.
- When flashing from OpenWRT, use the `sysupgrade` image. Although the factory image will work, the sysupgrade image has the fringe benefit of preserving the UBI container between flashes, providing some wear-leveling.

OEM --> OpenWRT

1. Navigate to *Connectivity - Manual Update*
2. *Choose File* and select the OpenWRT `.img` file downloaded from the links above
 - Once flash completes, router will reboot:
 - If the OpenWRT image you selected has LuCI pre-installed, simply navigate back to 192.168.1.1 [<http://192.168.1.1>] and log in
 - If the OpenWRT image you selected does not have LuCI pre-installed, telnet in and install LuCI
 - `opkg update ; opkg install luci`

You may need to refresh the network connection of your PC:

- Simply unplugging the LAN cable, waiting 5 seconds, and plugging in back in should do.
 - Worst case, reboot the PC.
- Some ISP's ASDL/cable modems won't let you back onto the Internet until you:
 1. Unplug modem *and* router (~ 15 sec)
 2. Turn modem back on *and* wait for it to fully boot (~ 60 sec)
 3. Turn router back on.

If the firmware you chose has LuCI installed, navigate to 192.168.1.1 [<http://192.168.1.1>] and log in. Change the login password (none set initially):

- This is the **ADMIN** password for the router, **NOT** your *WiFi* password to connect devices.
- Please be aware, there is no confirmation for the password if set via the login page. It's advisable to set the password via the *System - Administration* page or via *telnet*, as it requests a confirmation.

If the firmware does not have LuCI installed, you will need to telnet into your device using 192.168.1.1 to set an admin password via the command `passwd`. Once a password has been set, you can then use an SSH client to securely log into the router.

- WiFi is *disabled* by default and you will need to set ESSIDs and passwords for the two [WiFi] radios.
 - It is recommended to use WPA2-PSK and Force CCMP (AES), as both are the only secure means of encryption.
 - **DO NOT**, *under any circumstances*, utilize WPS (WiFi Protected Setup); it's not even remotely secure

OpenWRT --> OEM

- It's recommended to first save your OpenWRT configuration for future flashing
 - *System - Backup/Flash Firmware - Generate Archive*
 - **Note:** If jumping between big releases of OpenWRT, it's best **not** to restore settings, but instead to set them up by hand again from scratch.
1. Download image version 1.1.8 [http://www.protechs-online.com/downloads/FW_WRT1900AC_1.1.8.164461_prod.img] first, using the instructions in the Revert to *Linksys* section.
 2. Login to OpenWRT via 192.168.1.1 [<http://192.168.1.1>]
 3. *System - Backup/Flash Firmware*
 4. Choose the Linksys OEM `.img` file saved from *Revert to Linksys*, untick *Keep Settings*, then *Flash Image*
- When updating between OpenWRT builds/releases, it's always recommended to flash back to stock **first**, then reflash OpenWRT from stock
 - This is a precaution that ensures there are no problems in the flashing process.

Stock Firmware Recovery

contributed by edgeman

Manually switch the WRT1900ac from a trashed [`stock`] flash to the secondary [`backup`] flash:

1. **Reset router by pressing reset button until PWR light starts to flash {should take ~ 15 seconds}**
 - Once Power LED stops flashing, power off router with power switch

2. **Turn power back on and Power LED will light.**
 - As soon as any other LED turns on, power off router with power switch
3. **Turn power back on and Power LED will light.**
 - As soon as any other LED turns on, power off router with power switch
4. **Turn power back on and Power LED will light.**
 - As soon as any other LED turns on, power off router with power switch
5. **Turn power back on and Power LED will light.**
 - Let router power up completely; it should now be on the alternate firmware

Note:

contributed by *leitec*

- This method only works if you had *auto_recovery* set to *on* in the boot loader.
 - If you look at the serial output of the factory firmware while it's flashing a non-factory image, it'll output something about setting *auto_recovery* to off, because it's not a recognized image. Kaloz recently changed the *sysupgrade* process on the WRT1900ac so that it turns *auto_recovery* on before flashing, then off upon a successful boot of the new image.

contributed by *kaloz*

- In OpenWRT, *auto_recovery* is only enabled when you're flashing an image; after a successful boot, it's disabled.
 - If the new image doesn't boot, on the **third** try *auto_recovery* kicks in and boots back the previous (working) version, disabling *auto_recovery* again.

TFTP Firmware Flash

Requirements

- USB to TTL cable (see picture below for connectivity)
- A working serial interface like PuTTY [<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>] or Tera Term [<http://tssh2.osdn.jp/index.html.en>] (set speed to 115200 baud)
 - If using PuTTY, here [<http://1drv.ms/1BIvNLK>] is a pre-built profile to use for the serial connection
- A TFTP Server running on a client workstation connected to the WRT1900AC via LAN (such as TFTP32 [<http://tftpd32.jounin.net/>])
 - A pre-built TFTP32 config file can be found here [<http://1drv.ms/1CAzn5l>] and must be placed in the TFTP root folder with the executable
 - You will need to customize the *Base Directory* [BaseDirectory=D:\TFTP\FLASH] to reflect your directory where the image file is located
- TFTP Server LAN configured with IP Address 192.168.1.20
- The firmware to load is in the TFTP Server ready for download.
 - Your image file directory must not contain any spaces
 - For example, D:\TFTP\Image-Directory\image-name.img
- The PuTTY pre-built profile is a registry key, so I've also uploaded the same as a text file; all three files (tftp32.ini, serial.reg, serial.txt) can be found here [<http://1drv.ms/1KhyO7l>]

Instructions

1. With router off, connect USB to TTL cable to router serial port & PC
 - This assumes you've installed the USB-TTL drivers and set correct COM port & BAUD rate
2. Manually set your LAN IP to subnet 192.168.1.20/24 [255.255.255.0]
3. Load Serial profile in PuTTY (should be a blank terminal window) & open TFTP server
4. Boot WRT1900AC (should see u-boot output in terminal window)
5. At the 3 second interrupt boot delay, press any key

U-Boot Commands

- the exact name of the firmware image must be input
- If you want to be 100% sure you're running a firmware image, flash the firmware to both the primary and secondary image locations by substituting:
 - run **update_both_images** in place of **run flash_pri_image**

```

setenv firmware_name firmware_image_name.img
setenv ipaddr 192.168.1.1
setenv netmask 255.255.255.0
setenv serverip 192.168.1.20
run flash_pri_image
OR
run update_both_images

```

Video Tutorials

Linux

- Coming Soon - by lifehacksback

Mac

- lifehacksback's Tutorial [<http://youtu.be/hcmtxdHkB4Y>]

Windows

- Coming Soon - by lifehacksback

Serial Port

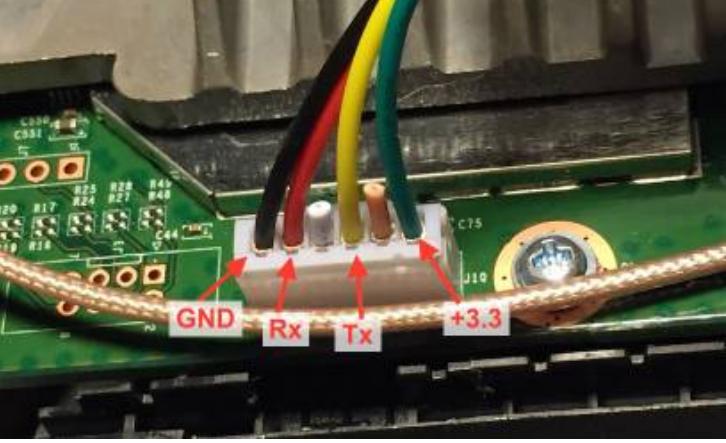
Header

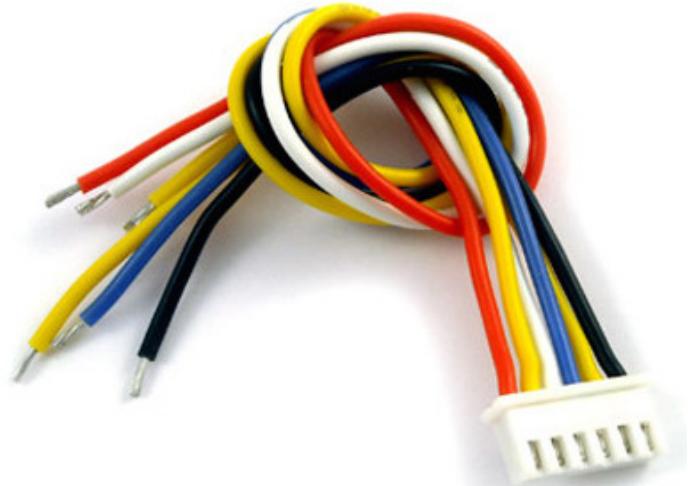
- Serial Port is labeled **J1** on the board and utilizes a **JST PH 6 pin** connector with a **2.0mm pitch**
- The more common 2.54mm pitch connectors will not fit properly - this includes the female connectors on popular USB-TTL adapters; however, removing the plastic casing from 2.54mm female connectors allows for a stable enough connection in a pinch.
- The correct JST PH 6 connector w/cable can be purchased online (eBay listings are common).

Pin Out

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
GND	RX	?	TX	?	+3.3

Photos

Serial Header w/ attached JST PH6 cable	Typical JST PH6 cable
	



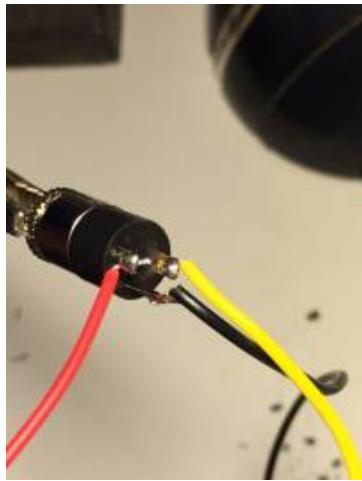
- While the picture above shows leads 3 & 5 cut, it's **not** recommended to do so so. De-pinning the leads would be recommended.
 - De-pinning
 - use a small pick tool or paperclip to release the metal lock tab located on the top or bottom of the pin inside the plastic header. Depending on the style of terminal used in the header, the lock tab will accessible either from the back (most likely) or front (not common) of the terminal lead

3.5mm Jack

- One example of a simple connection is the use of a 3.5mm stereo headphone jack, like the Philmore 504K [shown below] or a USB-TTL AJ (Audio Jack) cable. Avoid using any 3.5mm jack smaller than this type, as there will not be sufficient threads for the nut that holds the jack to the casing.
 - There are number of different versions of the 3.5mm female jack, some are barrel shaped like the Philmore, others are square shaped; some have terminals that point vertically, while others have terminals that point horizontally (it's user preference as to which one to use).
 - Female 3.5mm terminal jacks come in 6 types, 1 pin through 6 pin. The one purchased must be at least a 3 pin.
 - A number of companies sell pre-made USB-TTL AJ cables; of which, Pin 2 (Rx) will be the tip of the 3.5mm jack, and Pin 3 (Tx) will be the ring on the 3.5mm jack, and Pin 5 (Gnd) will be the Ground connector on the 3.5mm.
 - Inside the upper black housing, next to the antenna connector on the right side (front) of the unit, there is space for the 3.5mm socket.
 - On the inside of this housing, there are several ridges top to bottom, using a diagonal cutter you can easily trim one of these off to make space for this connector.
 - A 1/4" hole in the housing will let this mount easily.
 - For final assembly, be sure to insulate your connections on the 3.5mm jack; adhesive lined heat-shrink tubing around the soldered connection would be ideal for this.
 - While regular shrink tubing will work, adhesive lined provides strong stability to the joint it covers due to the thicker wall & rigidity from the adhesive once cured.

Photos

Philmore 504K	Finished Connection



Arduino

You can also use a RS-232 Serial to USB-TTL converter (MAX3232 below) or an Arduino.

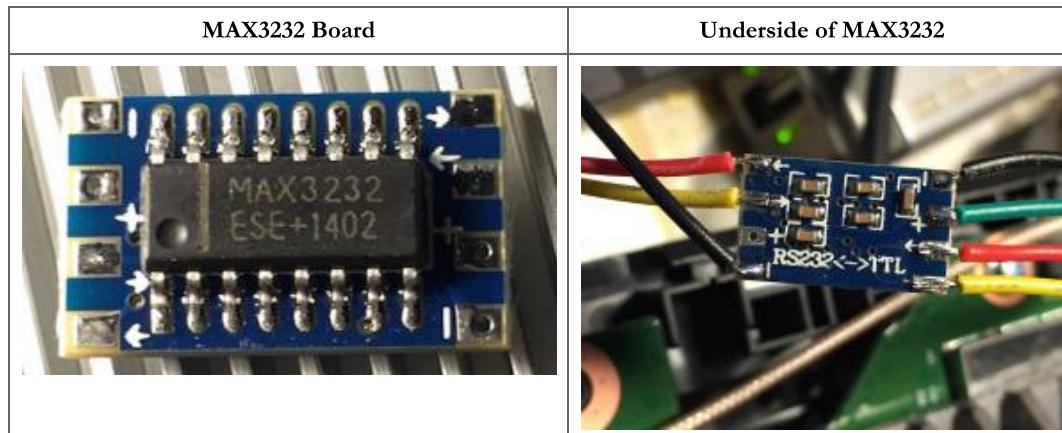
WRT1900ac	VCC 3.3v	TX	RX	GND
Arduino	3.3	PIN 0	PIN 1	GND

- Arduino [http://www.arduino.cc/en/uploads/Main/ArduinoUno_R3_Front.jpg]

MAX232 RS-232

- The MAX3232 RS-232 Line Driver chip can be purchased as a breakout board from a number of sources, an example of this is shown below.
 - This chip will convert the TTL level RS-232 signals to the standard 12v voltage used by most RS-232 interfaces.

Photos



- Boards will differ on exact connections, just be sure you connect the TTL side to the WRT1900AC, and the RS-232 side to your external connector.

Older news

The following information has been superseded by current builds, and is included only for historical interest. WRT1900AC was announced on 6th of January 2014 as a router developed to be used with OpenWrt. Despite Linksys' announcement of working with OpenWrt community, no patches and no info were shared for the next several months. You can read the Official statement re: OpenWrt support for Linksys WRT1900AC at <https://forum.openwrt.org/viewtopic.php?pid=230686> * On the 3rd of April 2014 Belkin posted link to ftp server containing patches adding WRT1900AC support. They couldn't be applied because of being incorrectly posted, not signed off and adding binary wireless driver ap8x.ko. * 5 days later a patchset in the form of single e-mail was posted to the openwrt-devel. It was malformed and not signed off, so still couldn't be applied. Release of wireless driver has been postponed. * Linksys started shipping on 10th of April * Wireless driver was announced to stay closed source