



OM-O2S / OM-O2SP

Onion Omega2S IoT compute modules

Updating the Bootloader

R01

Application Note

Abstract

This document describes how to update the bootloader running on your Omega2 device. The bootloader will be updated using the web recovery feature to flash a new bootloader to the Omega's internal memory.

Updating the Bootloader

This guide illustrates how to update the bootloader running on your Omega2 device. The bootloader will be updated by using the web recovery feature to flash a new bootloader to the Omega's internal memory. You will need access to the serial console on UART0 and the Ethernet port to make use of the web recovery feature.

Upgrading the bootloader will let you take advantage of our latest development efforts on the bootloader. The most notable improvement is that all pins will now stay stable and their power-on-reset values during boot.

See the full summary of bootloader changes here: <https://github.com/OnionIoT/omega2-bootloader/blob/master/OMEGA2-CHANGELOG.md>

Step 1: Get Everything Together

Gather the hardware ingredients:

- The target Omega2 device
- Access to Omega's serial console on UART0 and Ethernet Port
 - If using a through-hole Omega2/2+: Expansion Dock and Ethernet Expansion
 - If using a surface-mount Omega2S/2S+: Omega2S Development Kit
- Ethernet Cable
- MicroUSB Cable

Optional: If you want to check which release of the bootloader your device is currently running, see the [Checking your Bootloader Version](#) section below.

Step 2: Downloading Bootloader Binary

Before we proceed to the actual flashing process, we need to download the bootloader binary that we wish to flash.

Open your web browser and go to the Onion Bootloader Repo:

<http://repo.onioniot.com/omega2/bootloader/>

Last Modified	Size	Key
		../
2019-03-01T16:31:23.000Z	0.1 kB	
2019-03-01T16:33:26.000Z	171.8 kB	uboot-omega2-20170919.bin
2019-03-01T16:33:02.000Z	170.8 kB	uboot-omega2-20190125.bin
2019-03-01T16:31:45.000Z	170.8 kB	uboot-omega2-20190301.bin
2019-10-25T14:14:19.000Z	170.8 kB	uboot-omega2-20190819.bin
2019-10-25T14:14:19.000Z	170.8 kB	uboot-omega2-20191017.bin
2019-12-13T22:46:42.000Z	171.6 kB	uboot-omega2-20191111.bin
2019-03-01T16:33:15.000Z	171.8 kB	uboot-omega2p-20170919.bin
2019-03-01T16:33:02.000Z	170.8 kB	uboot-omega2p-20190125.bin
2019-03-01T16:31:43.000Z	170.8 kB	uboot-omega2p-20190301.bin
2019-10-25T14:14:18.000Z	170.8 kB	uboot-omega2p-20190819.bin
2019-10-25T14:14:18.000Z	170.8 kB	uboot-omega2p-20191017.bin
2019-12-13T22:46:42.000Z	171.6 kB	uboot-omega2p-20191111.bin

Make sure to select the correct bootloader for your device!

- If your device has **16 MB** of internal flash and 64 MB of RAM, like the **Omega2** or **Omega2S**, use the binary named `uboot-omega2-[DATE-CODE].bin`
- If your device has **32 MB** of internal flash and 128 MB of RAM, like the **Omega2+** or **Omega2S+**, use the binary named `uboot-omega2p-[DATE-CODE].bin`

We recommend using the latest release of the bootloader. See the [bootloader changelog](#) for details of changes and improvements in each release.

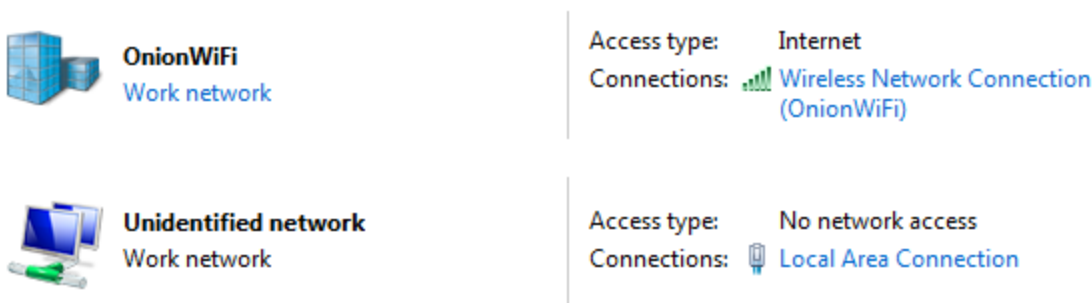
Step 3: Configuring computer's ethernet network

Next, configure your computer's ethernet network to manually set its IP address to `192.168.8.100` and subnet mask to `255.255.255.0`. By doing so, your computer will be able to communicate with the Omega over ethernet while it is in web recovery mode.

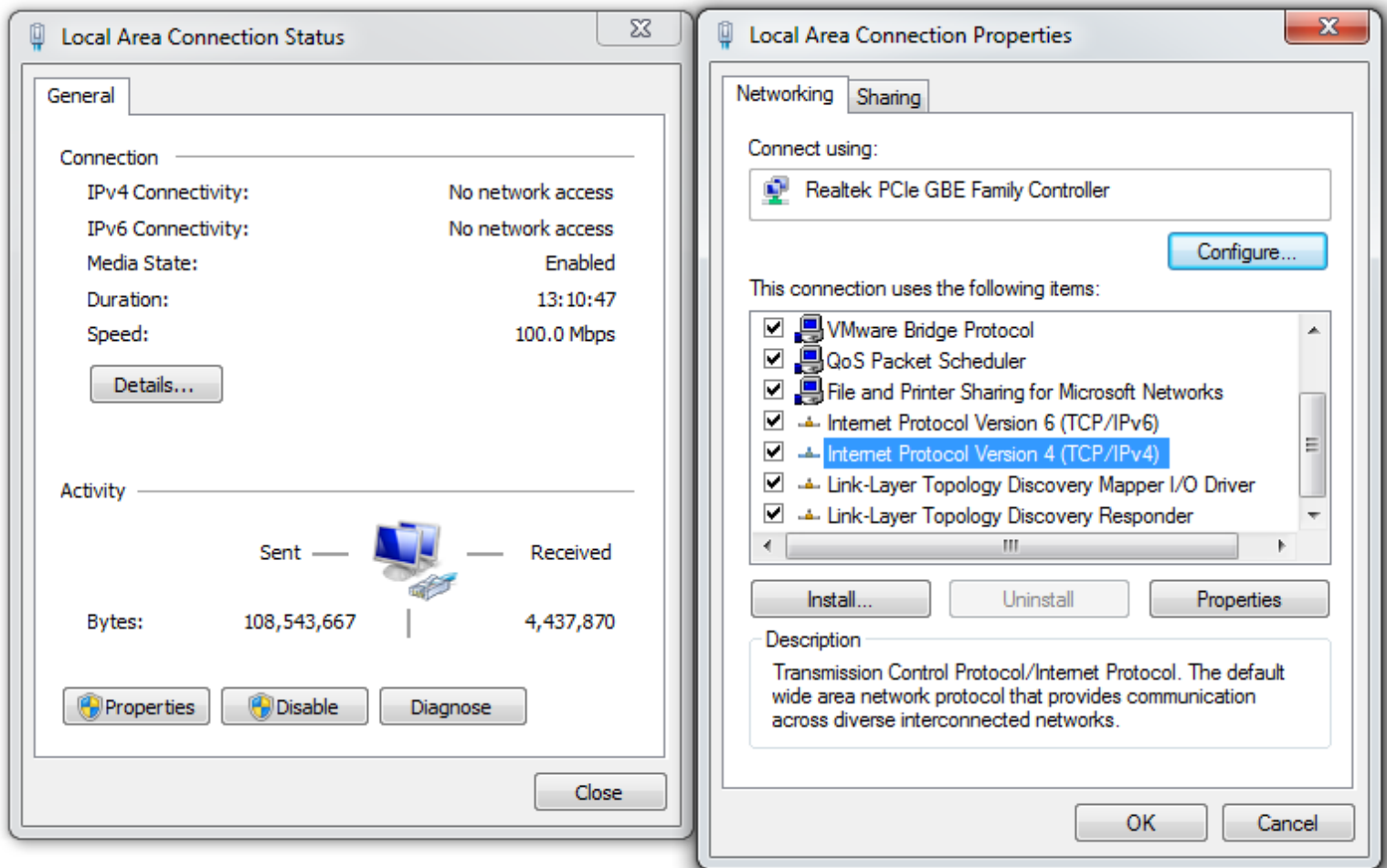
In Web Recovery Mode, the Omega's ethernet port will have a self assigned 192.168.8.8 IP address.

The following procedure outlines the instructions for Windows:

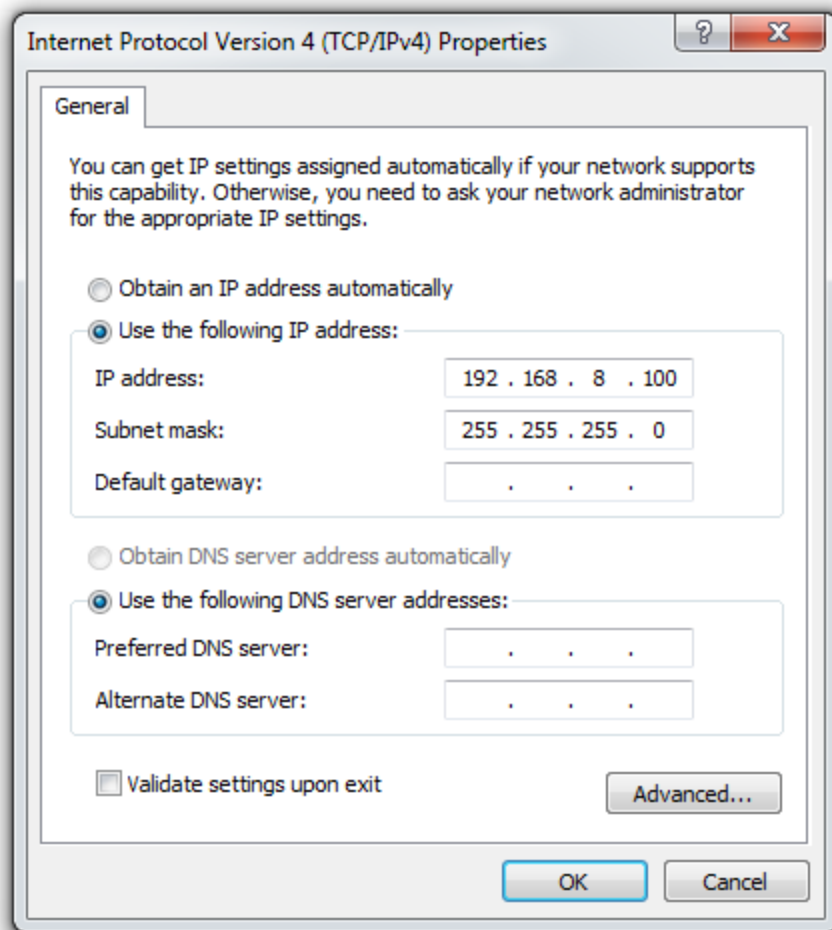
- You should notice a new device in the Network and Sharing center:



- We need to set up an IP address corresponded to our Omega's ethernet settings. Click on Local Area Connection, under the Undefined Network and select Properties.



- Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.



- Check Use the following IP address: radio button and manually type 192.168.8.100 . Once finished, the subnet mask will be created automatically. Click Ok . Now you are all set.

Step 4: Activating Web Recovery Mode

Now, connect your Omega to your computer with the ethernet cable. But do not power on the device just yet!

First, connect to the Omega's command line through serial. Then, power on the device **and** press the **SW Reset** button at the same time. This will get you to the bootloader and you'll see the following menu:

```
Board: Onion Omega2 APSoC DRAM: 128 MB
relocate_code Pointer at: 87f60000
flash manufacture id: c2, device id 20 19
find flash: MX25L25635E
*** Warning - bad CRC, using default environment
```

```
=====
Onion Omega2 UBoot Version: 4.3.0.3
-----
```

```
ASIC 7628_MP (Port5<->None)
DRAM component: 1024 Mbits DDR, width 16
DRAM bus: 16 bit
Total memory: 128 MBytes
Flash component: SPI Flash
Date:Oct 18 2016 Time:17:29:05
=====
icache: sets:512, ways:4, linesz:32 ,total:65536
dcache: sets:256, ways:4, linesz:32 ,total:32768
CPU freq = 575 MHZ
Estimated memory size = 128 Mbytes
Resetting MT7628 PHY.
Initializing MT7688 GPIO system.
```

```
*****
* Hold Reset button for more options *
*****
```

You have 40 seconds left to select a menu option...

```
Please select option:
[ Enter ]: Boot Omega2.
[ 0 ]: Start Web recovery mode.
[ 1 ]: Start command line mode.
[ 2 ]: Flash firmware from USB storage.
```

Note that the **Reset** button is connected to the *active-high* FW_RST/GPIO38 pin. To get to the bootloader prompt when using an Omega2S module, hold the SW_RST/GPIO38 pin at logical high while the device is booting. On the Omega2S Development Kit, this pin is connected to a button labelled WPS_RST.

We need to activate Web Recovery Mode by pressing 0 . Be quick, you only have 40 seconds until the Omega reboots and tries to boot normally. After pressing 0 , you should see the following output:

```
Bringing Eth0 (10/100-M) up...
```

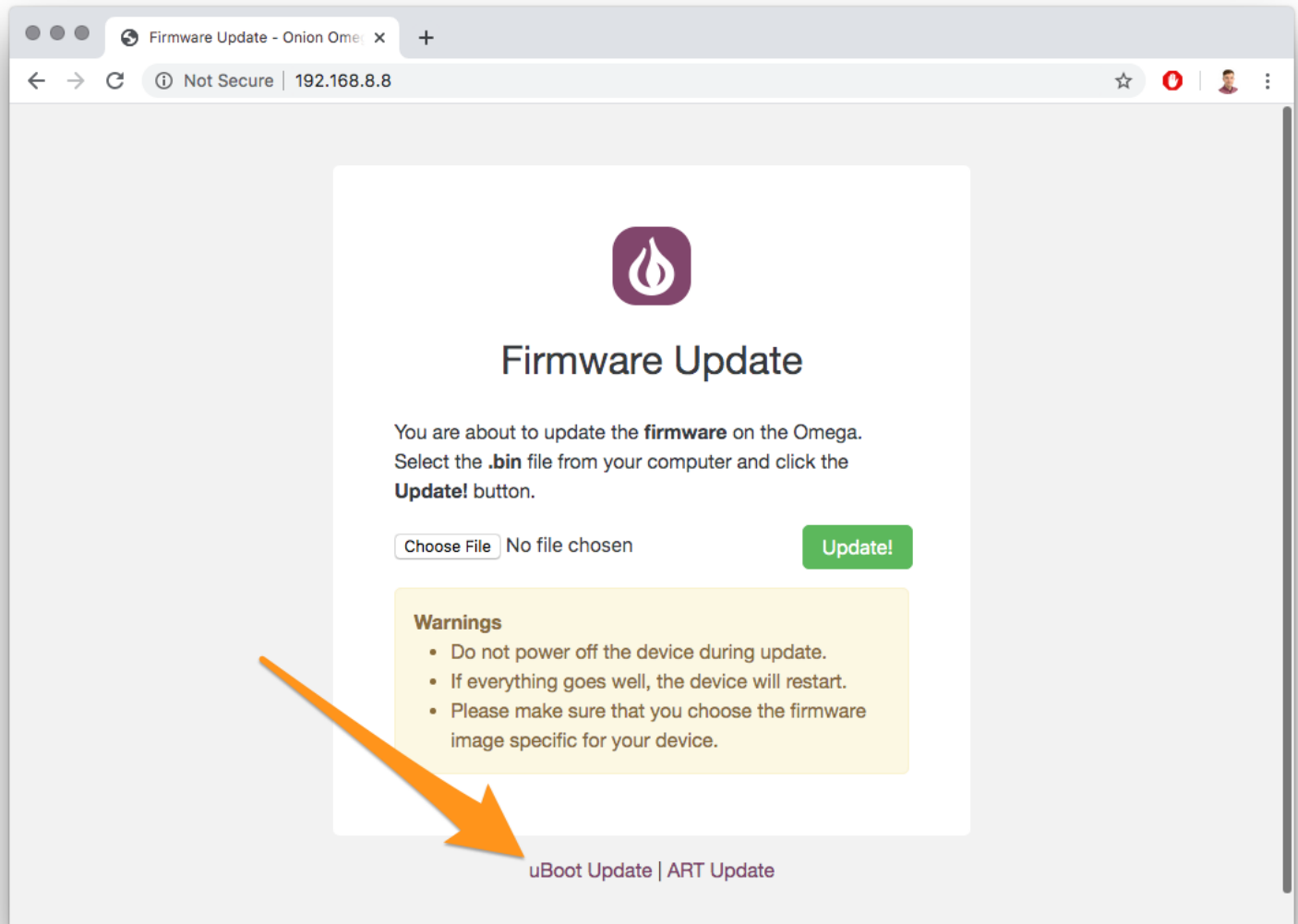
```
RT2880 ETH setup done.
```

```
HTTP server starting at 192.168.8.8 ...
```

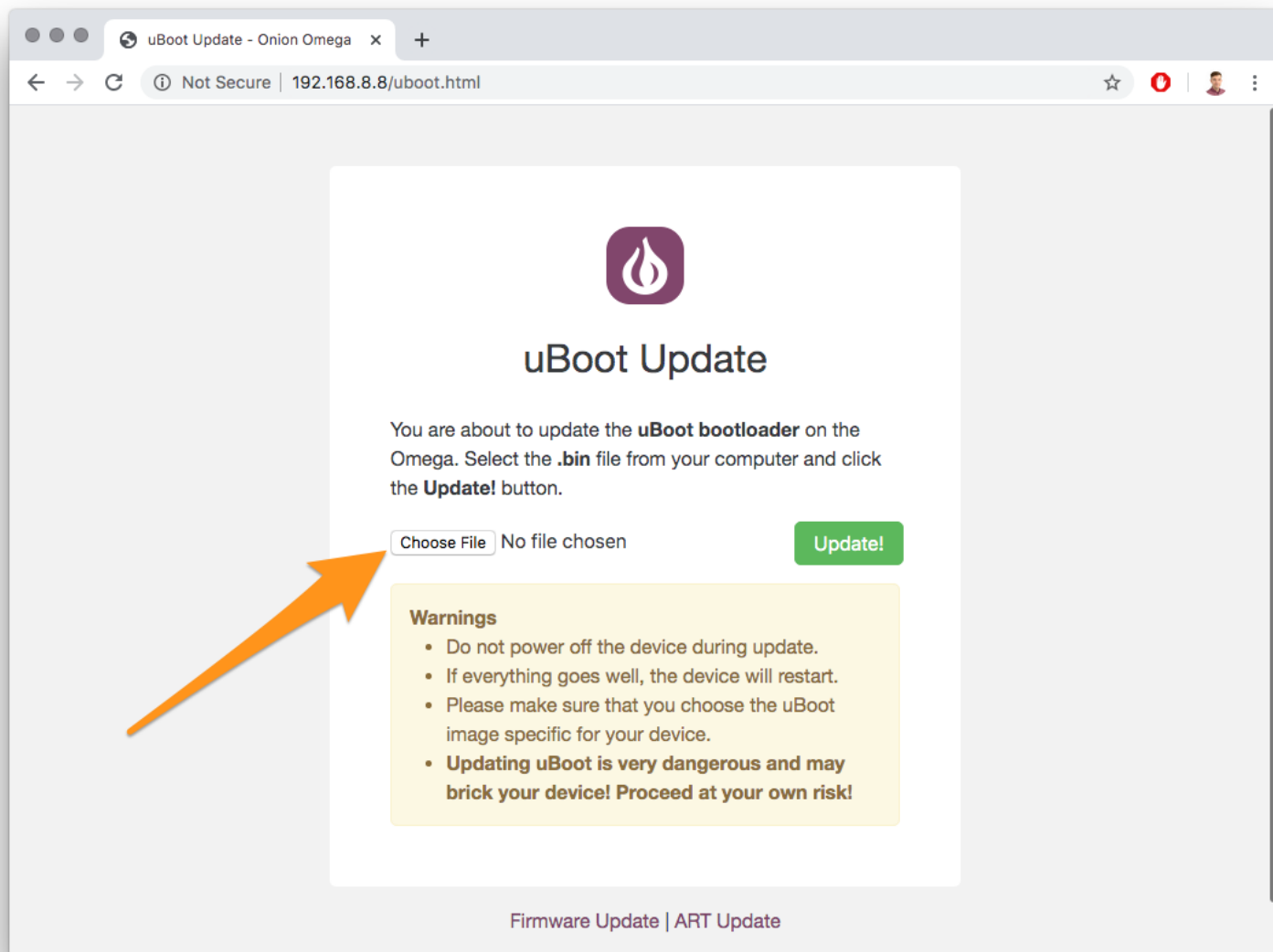
```
HTTP server is up and running.
```

Step 5: Flash the New Bootloader

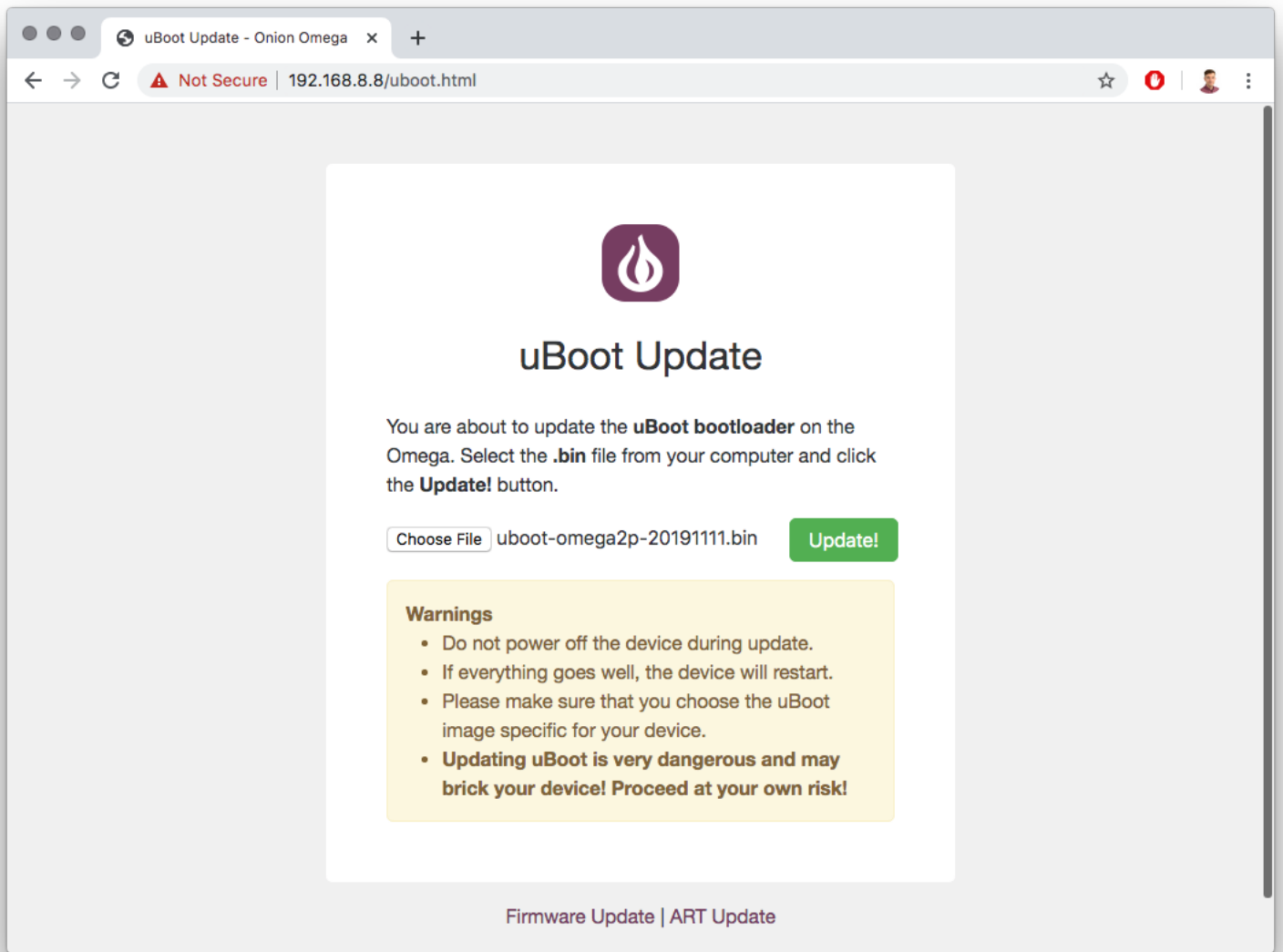
Open your Browser and type `192.168.8.8` in the search window. You will be presented with the firmware update page. Ignore that and click **uBoot Update** at the bottom



Now, we'll be able to **select** the bootloader binary to be flashed on your Omega.



Use the form to select the binary downloaded in step 2:



IMPORTANT: updating the bootloader is a potentially destructive action if the binary is corrupted or the bootloader has errors. Make sure you're aware of the consequences before updating.

When you're ready, hit the `Update!` button and you will see the Omega's serial console output somethign like the following:

```
Bringing Eth0 (10/100-M) up...
RT2880 ETH setup done.
HTTP server starting at 192.168.8.8 ...
HTTP server is up and running.
Request for: /
Request for: /style.css
Request for: /o.gif
Request for: /favicon.ico
## Error: file not found!
Request for: /uboot.html
Request for: /style.css
Request for: /o.gif
Request for: /uboot.html
Request for: /style.css
Request for: /o.gif
Data will be downloaded at 0x81000000 in RAM
Upgrade type: U-Boot
Upload file size: 175696 bytes
Loading: #####
          #####
          #####
          #####

HTTP upload is complete.
Upgrading...

*****
*      U-BOOT UPGRADING      *
* DO NOT POWER OFF DEVICE! *
*****

...
...
Done!
HTTP ugrade is done! Rebooting...
```

It will take about 10 seconds to flash the new bootloader to your device. Once this is done, the Omega will automatically reboot.

The Omega will boot normally if everything gone according to plan:

```
BusyBox v1.28.3 () built-in shell (ash)
```

Checking your Bootloader Version

Reboot into the Bootloader Menu

Connect to the Omega's command line through serial. Then, power on the device **and** press the **SW Reset** button at the same time. This will get you to the bootloader and you'll see the following menu:

```
*****
* Hold Reset button for more options *
*****
```

```
You have 40 seconds left to select a menu option...
```

```
Please select option:
```

```
[ Enter ]: Boot Omega2.
[ 0 ]: Start Web recovery mode.
[ 1 ]: Start command line mode.
[ 2 ]: Flash firmware from USB storage.
```

Note that the **Reset** button is connected to the *active-high* FW_RST/GPIO38 pin. To get to the bootloader prompt when using an Omega2S module, hold the SW_RST/GPIO38 pin at logical high while the device is booting. On the Omega2S Development Kit, this pin is connected to a button labelled WPS_RST.

Reading the Version Number

To read the bootloader version number, press `1` to `Start command line mode`.

The version number is indicated by the **date** shown at the top of the prompt:

```
You have 40 seconds left to select a menu option...
```

```
Please select option:
```

```
[ Enter ]: Boot Omega2.
[ 0 ]: Start Web recovery mode.
[ 1 ]: Start command line mode.
[ 2 ]: Flash firmware from USB storage.
```

```
Option [1] selected.
```

```
1: System Enter Boot Command Line Interface.
```

```
U-Boot 1.1.3 (Nov 11 2019 - 22:16:24)
```

```
Omega2 #
```

Notice how the date here, November 11, 2019 matches the date code on the binary:

Onion Software Repository x +

Not Secure | repo.onioniot.com/omega2/bootloader/

<http://repo.onioniot.com.s3.amazonaws.com/omega2/bootloader/>

Last Modified	Size	Key
		../
2019-03-01T16:31:23.000Z	0.1 kB	
2019-03-01T16:33:26.000Z	171.8 kB	uboot-omega2-20170919.bin
2019-03-01T16:33:02.000Z	170.8 kB	uboot-omega2-20190125.bin
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2019-03-01T16:33:02.000Z	170.8 kB	uboot-omega2p-20190125.bin
2019-03-01T16:31:43.000Z	170.8 kB	uboot-omega2p-20190301.bin
2019-10-25T14:14:18.000Z	170.8 kB	uboot-omega2p-20190819.bin
2019-10-25T14:14:18.000Z	170.8 kB	uboot-omega2p-20191017.bin
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