

The Velocloud Edge 510 is a discontinued enterprise router now widely available on platforms like eBay for under \$50 CAD. Following this guide transforms it into a fully functional firewall/router. Online reports show this should also be possible with the Edge 520 model.

While its performance is modest by today's standards, it features:

- Intel Atom C2358 CPU, 4 GB RAM, 8 GB eMMC
- 2 USB ports
- 4×1 Gbps Ethernet ports
- Reliable serial access and coreboot compatibility

This makes it a perfect candidate for homelab setups, network experimentation, and educational deployments. With OPNsense 25.7.6 (based on FreeBSD 14.3-RELEASE-p4), it supports full firewall and routing capabilities. For those seeking a plug-and-play experience, [Le Goût du Libre.com](https://le-goût-du-libre.com) offers pre-flashed units for 90\$ CAD, ready to deploy with OPNsense and coreboot - or you can buy your own on eBay and follow this guide.

Special thanks go to PhoenixSheppy on Github and to the Netgate forum contributors, which this guide is based on.

#### Post-install notes

- LAN and WAN ports are assigned to GE1 and G2 respectively. ⚠ **Changing these assignments in OPNsense may render the router unreachable.**
- The IP configuration after installation is as follows:
  - **WAN:** DHCP (address automatically obtained from the provider)
  - **LAN:** Static IP 192.168.1.1, with DHCP leases distributed within this range
- Wi-Fi is not enabled, despite antennas and wifi radio being present on some models. The wireless chipset on this router is not well supported by OPNsense. It is recommended to use external access points with VLAN configuration for Wi-Fi.
- ⚠ **Despite having Gigabit ports, actual performance may be limited by the processor, RAM, and enabled OPNsense features.** Check the OPNsense official documentation for more details.

#### OPNsense installer preparation and router coreboot configuration

1. Get the OPNsense **VGA** installer (yes, VGA) at <https://opnsense.org/download> and create a USB installer from it using BalenaEtcher or your preferred method. **Keep this key handy in case you need to reinstall OPNsense when experimenting**
2. Remove the small metal plate on the back of the router, at the right of the network ports, this will expose a mini-USB port. Connect a mini-USB cable into the device, and the other end to your PC.
3. Using a program like Putty, connect at 115200 Baud, and connect the power cable in the router, you should see some output as it boots up. Allow it to boot into VeloCloud OS.
4. The default login is root, password is Ve1oHe11oXXX (XXX=last-3 of S/N on bottom of device)
  1. **If this doesn't work**, reboot and watch closely, there will be a prompt offering to press `f` and `ENTER` to enter fail-safe mode
    1. Run the two commands below to change the root password

```
mount_root
echo -e "youpassword\nyoupassword" | passwd root
```

2. Reboot device and login with new password

5. Once logged in,

```
cd /root
```

6. From there, let's configure the network. Connect a network cable from your router or switch to the 4th port (GE4) and allow it to establish a link and connect. Connect your computer to port 1 (GE1).

7. Change to the existing firmware directory:

```
cd /root/firmware
```

8. Grab a copy of the modified coreboot firmware :

```
wget
https://raw.githubusercontent.com/PhoenixSheppy/VeloCloud-Edge-510-OPNsense-Conversion-Guide/refs/heads/main/firmware/2017-4-10-coreboot.rom
velocloud vc-edge:~/firmware - wget
https://raw.githubusercontent.com/PhoenixSheppy/VeloCloud-Edge-510-OPNsense-Conversion-Guide/refs/heads/main/firmware/2017-4-10-coreboot.rom
Connecting to raw.githubusercontent.com (185.199.108.133:443)
2017-4-10-coreboot.r 100% |*****| 8192k
0:00:00 ETA
velocloud vc-edge:~/firmware -
```

9. Change directory again :

```
cd ..
```

10. Let's update the DMI (Desktop Management Interface) data region in the firmware image:

```
./dmi-tool -u firmware/2017-4-10-coreboot.rom
Updating flash with current DMI info ...
Current DMI:
decoding ...
SN=CKPG933, UUID_str=a04d141b-0ff4-4e25-bbf0-ded5867a5296,
BSN=PH0TTRNNBP7L1, pname=2R0220 bversion=haEDG
Done. Please power cycle the board if the flash has been updated
```

11. Follow that with this command:

```
./dmi-tool -w -p EDGE510 -v 1
Programming DMI ...
Current DMI:
decoding ...
```

```
SN=CKPG933, UUID_str=a04d141b-0ff4-4e25-bbf0-ded5867a5296,  
BSN=PH0TTRNNBP7L1, pname=2R0220 bversion=haEDG  
Updating current DMI..  
No new system SN provided, using the current system SN  
No new UUID provided, using the current UUID.  
No new Board SN provided, using the current Board SN  
Done. Please power cycle the board if the flash has been updated
```

12. Finally, let's flash that firmware :

```
flashrom --programmer internal --write firmware/2017-4-10-c  
oreboot.rom  
flashrom v0.9.8-r1888 on Linux 3.14.79 (x86_64)  
flashrom is free software, get the source code at http://www.flashrom.org  
  
Calibrating delay loop... OK.  
coreboot table found at 0x7fbee800.  
Found chipset "Intel Avoton/Rangeley".  
This chipset is marked as untested. If you are using an up-to-date version  
of flashrom *and * were (not) able to successfully update your firmware  
with it,  
then please email a report to flashrom@flashrom.org including a verbose (-  
V) log.  
Thank you!  
Enabling flash write... OK.  
Found Winbond flash chip "W25Q64.V" (8192 kB, SPI) mapped at physical  
address 0x00000000ff800000.  
Reading old flash chip contents... done.  
Erasing and writing flash chip... Erase/write done.  
Verifying flash... VERIFIED.  
velocloud vc-edge:~ -
```

13. To finalize, the watchdog timer that reboots the systems and prevents from running another OS has to be disabled. Run the following command:

```
i2cset -y 1 0x24 0x00 0x00 && i2cset -y 1 0x24 0x01 0x00
```

After you've run those two commands, your device is ready to install OPNsense.

### **OPNsense live boot from USB VGA installer**

1. Unplug the power cable, plug the OPNsense VGA installer USB key prepared previously in either USB port.
2. Remember to have the mini-USB cable plugged into the serial port
3. Unplug the network cable from the GE4 port and plug it into the GE2 port. This is where OPNsense will search for and configure its WAN connection.

4. Plug a network cable from your PC into the GE1 port. This is where OPNsense will configure the LAN and provide DHCP leases. Make sure your PC connection to the router is stable, if you loose the SSH connection to the router during installation (for example, by your PC going into sleep mode), you will have to start over from that step.
5. Plug the power cable again. The boot sequence **will take 3-4 minutes**, be patient. The serial output should scroll by and briefly show the OPNsense logo and menu. The last few lines of output should look something like:

```
/boot/kernel/carp.ko size 0xfb90 at 0x244d000  
/boot/kernel/if_gre.ko size 0xaa30 at 0x245d000  
/boot/entropy size=0x1000
```

After 3-4 minutes, you should be able to ping the router at 192.168.1.1.

### OPNsense installation via SSH

1. The installer can be launched by SSH, from your PC in a terminal:

```
$ ssh installer@192.168.1.1
```

2. When prompted, enter the password : opnsense The installer should launch. All questions can be kept as default except the following :
  1. At the second step, choose **UFS/UEFI Hybrid**. ZFS is ideal on systems with more storage and resources, but not practical on this configuration. You can decide to try it anyways, this is a homelab device to experiment.
  2. At the third step, choose the internal storage eMMC storage as target for installation. This will replace the factory Velocloud OS. In this example an external 64GB USB key used for the installer was detected as da0, the other storage (da1) indicating 7GB is the internal storage.
3. After that, proceed with defaults. You will see progress indicators. This should take **under 8 minutes**.
4. You can then change the root password (default is opnsense), or just choose **Complete Install**.
5. Next step, choose **Reboot** and the serial output should show the boot sequence, showing the text OPNsense logo and menu, and messages, as above. Again, this will take 3-4 minutes.

### References

- [VeloCloud Edge 510 OPNsense Conversion Guide](#)
- [Netgate original forum post](#)
- [Hardware sizing and setup](#)
- [OPNsense serial access](#)
- [OPNsense installer procedure in detail](#)

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