**Open-Source Custom Router Firmware**

**Routers usually come with a standard OS (firmware) that isn’t hardened for security or editable to harden the OS**

**Custom firmware is a way to get around this**

**To install**

* Go to site of router firmware
* Download router firmware
* Using admin console, perform router upgrade by uploading firmware file to router
  + Called flashing the router
* **Make sure it’s the right firmware for router or you can brick it**

**OpenWrt**

Embedded OS based on the Linux kernel, primarily used in embedded devices to route network traffic

Used in printyers webcams IoT devices and routers

Main components

* Linux Kernel
* UtilLinux
* uClipC
* BusyBox

BusyBox

Multi-call binary that combines many common UNIX utilities into a single executable

OpenWrt components are optimised for size to be used in limited storage devices like routers or IoT devices

* Has a web interface and a command line interface
* Gargoyle is an easier interface for it

**Services/Packages available via opkg manager**

* Real time network monitoring
* VLAN
* Network isolation
* VPN client or server
* 3500 other packages
* The most flexibility among firmware options

**LibreCMC**

Based on OpenWrt

Supports only handful of devices

* Adheres to free software foundations which is why you may want to use it
* Hared to set up and hard to install so not for beginners

**DD-Wrt**

Based on OpenWrt

* Real time network monitoring
* VLANs
* Network isolation
* OpenVPN client / server
* Easier than OpenWrt
* Doesn’t support as many routers, but does support most common home routers

Has a web interface and command line interface accessed via SSH

NetGear R7000 AC1900, £130, high end router that is compatible and very customisable

Smallnetbuilder.com router charts

* Independent evaluations on outer performance
* NetGear R7000 is at the top of the list with the highest throughput

**Make sure the router you buy is compatible**

**Can also buy pre-flashed routers**

* Flashedrouters.com (not recommended) more expensive but don’t have to flash yourself and risk bricking

Examples of what custom firmware can do:

* Can run TOR client on the router
  + Forcing all internet traffic to be routed via the TOR network
  + Or for a specific device
* Set up a VPN client on the router
  + Route all traffic for specific devices based on certain conditions
  + Force your phone or work laptop to go over VPN etc.
* PfSense
  + Custom router firewall