Making Mesh Firmware

Copy the proper folder into the root of the build system you are working with. There are mesh files for 19.07, 21.02 and 22.03.

You use *menumesh* to create or edit the config files for the firmware.
Example :

./menumesh h721

Since the config files are slightly modified version of those found in the */configfiles/template* folder you can just copy them from there to */configfiles/template_custom* and then edit them.

There are several changes need to be made to the config file if this is a new router.

Go to *Network (or Network->WirelessAPD)* and scroll down until you reach *wpad*. Remove (set to N) any wpad package that is currently selected. Then select (set to Y) *wpad-mesh-openssl*.

If the router uses a QCA9xxx wifi module for 5Ghz then go to *Kernel Modules* and the *Wifi* submenu. Remove (set to N) *kmod-ath10k-ct* and add (set to Y) *kmod-ath10k.* Not all routers will use the 'ct' drivers so nothing needs to be done with them.

Then go to Firmware and remove (set to N) all *ath10k-firmware-qca9***-ct* packages. There may be more than one of these. Add (set to Y) the matching *ath10k-firmware-qca9**** packages.

Save the config. Then build the firmware using the *mesh* script. Example :

./mesh masterh721

for a Master firmware or

./mesh nodeh721

for a Node. Both firmware use the same config file, *.config_h721* in this case.

Please note that the Master firmware has an IP Address of *192.168.1.1* while the Node firmware has an IP Address of *192.168.1.20* so it is possible access a node without conflict. The nodes don't need to have different IP Addresses from each other as long as you only access them via Ethernet.

If the Nodes all have the same IP Address then accessing them when they are in the Mesh and you are only connected via Wifi or through the Master then you never know which Node will be selected.

Once set up there is no real need to access any of the Nodes. They have a minimal firmware that allows changing the IP and the Wifi Access Point settings. You can not change the 5Ghz Wifi radio (channel, mode, width) as this must be fixed for the Mesh to work. The Wireless menu does not allow these changes.

In the Master firmware you also can't change the 5Ghz radio information so the Mesh is always working. To see information on the Nodes in the Mesh go to *Status->Mesh Status*. This shows each Node with data about it. The RX and TX bytes are the data moving over the Wifi and is not the Internet bandwidth being used, although that is included in these figures.

Adding a New Router

A new router is added by creating a config file as described above and then adding the definition to the *mesh.json* file. A template can be used to ease the process.

```
"MASTERXXX": {
        "details": "Router Name",
        "type": "1",
        "build": "2102",
        "package": "ext-mesh-master",
        "config": ".config_router,
        "image": "firmware name",
        "imagepath": "path to file",
        "mod": "Mesh-Master-Name,
        "ext": "-upgrade.bin",
        "addons": ["readme.pdf"],
        "custom": {
            "wifi": {
                "SSID2G": "Mesh 2G",
                "SSID5G": "Mesh 5G",
                "Password": "rooter2017"
            },
            "image": {
                "Material": "header.png",
                "Argon": "rosy.png",
                "Tomato": "rosy.png"
            },
            "name": {
                "model": "Mesh Master Name",
                "hostname": "Mesh Master"
            },
            "files": "/Mesh/files-master/"
        }
    }
```

```
"NODEXXX": {
        "details": "Router Name",
        "type": "1",
        "build": "2102",
        "package": "ext-mesh-node",
        "config": ".config_router,
        "image": "firmware name",
        "imagepath": "path to file",
        "mod": "Mesh-Node-Name,
        "ext": "-upgrade.bin",
        "addons": ["readme.pdf"],
        "custom": {
            "wifi": {
                "SSID2G": "Mesh 2G",
                "SSID5G": "Mesh 5G",
                "Password": "rooter2017"
            },
            "image": {
                "Material": "header.png",
                "Argon": "rosy.png",
                "Tomato": "rosy.png"
            },
            "name": {
                "model": "Mesh Node Name",
                "hostname": "Mesh Node"
            },
            "files": "/Mesh/files-node/"
        }
    }
```

As you can see the templates for the Master and the Node are very similar and the information that needs changing is the same. This is as follows :

- **MASTERXXX** or **NODEXXX** – this is the name given to either the Master or Node firmware when you build it with the *mesh* script. An example would be be MASTERH721 or NODEH721. This must be in upper case only.
- **Router Name** – this can be any name as it is not used.
- **.config_router** – the name of the config file for this router. An example is *.config_h721*.

- **Firmware name** – this is the name of the firmware file that OpenWrt creates when you build a firmware. You can find this name by looking in the *router.json* file for the definition of that router. An example is *openwrt-ramips-mt7621-zbtlink_zbt-wg1608-16m-squashfs-sysupgrade.bin*
- **path to file** – this is the path used to find the file after it has been created. You can also get this from the router.json file for the definition of that router. An example is */ramips/mt7621/*
- **Mesh-Master-Name** or **Mesh-Node-Name** – Name is what you want to call the firmware when it is packaged up. An example is *Mesh-Node-WG1608*. This appears in 2 locations in the definition.

If you wish you can change the Wifi SSID and password in the definition. This is what is used by the Access Point and has no bearing on the Mesh network.

When adding a modified template to the mesh.json file there is something to remember. When you add it to the bottom of the file it originally looks like This.

```
        }
}
```

You need to have a comma (,) after the second last brace and then add the template after that. It would then look like this.

```
},
	"NODE750S": {
		"details": "AR750S",
		"type": "1",
		"build": "2102",
		"package": "ext-mesh-node",
		"config": ".config_ar750s",
		"image": "openwrt-ath79-nand-glinet_gl-ar750s-nor-squashfs-
sysupgrade.bin",
		"imagepath": "/ath79/nand/",
		"mod": "Mesh-Node-AR750S",
		"ext": "-upgrade.bin",
		"addons": ["readme.pdf"],
		"custom": {
			"wifi": {
				"SSID2G": "Mesh 2G",
				"SSID5G": "Mesh 5G",
				"Password": "rooter2017"
			},
			"image": {
				"Material": "header.png",
				"Argon": "rosy.png",
				"Tomato": "rosy.png"
			},
			"name": {
				"model": "Mesh Node AR750S",
				"hostname": "Mesh Node"
			},
			"files": "/Mesh/files-node/"
		}
	}
}
```


Note the comma on the first line which is used to separate each router definition. The last definition does not have a comma.