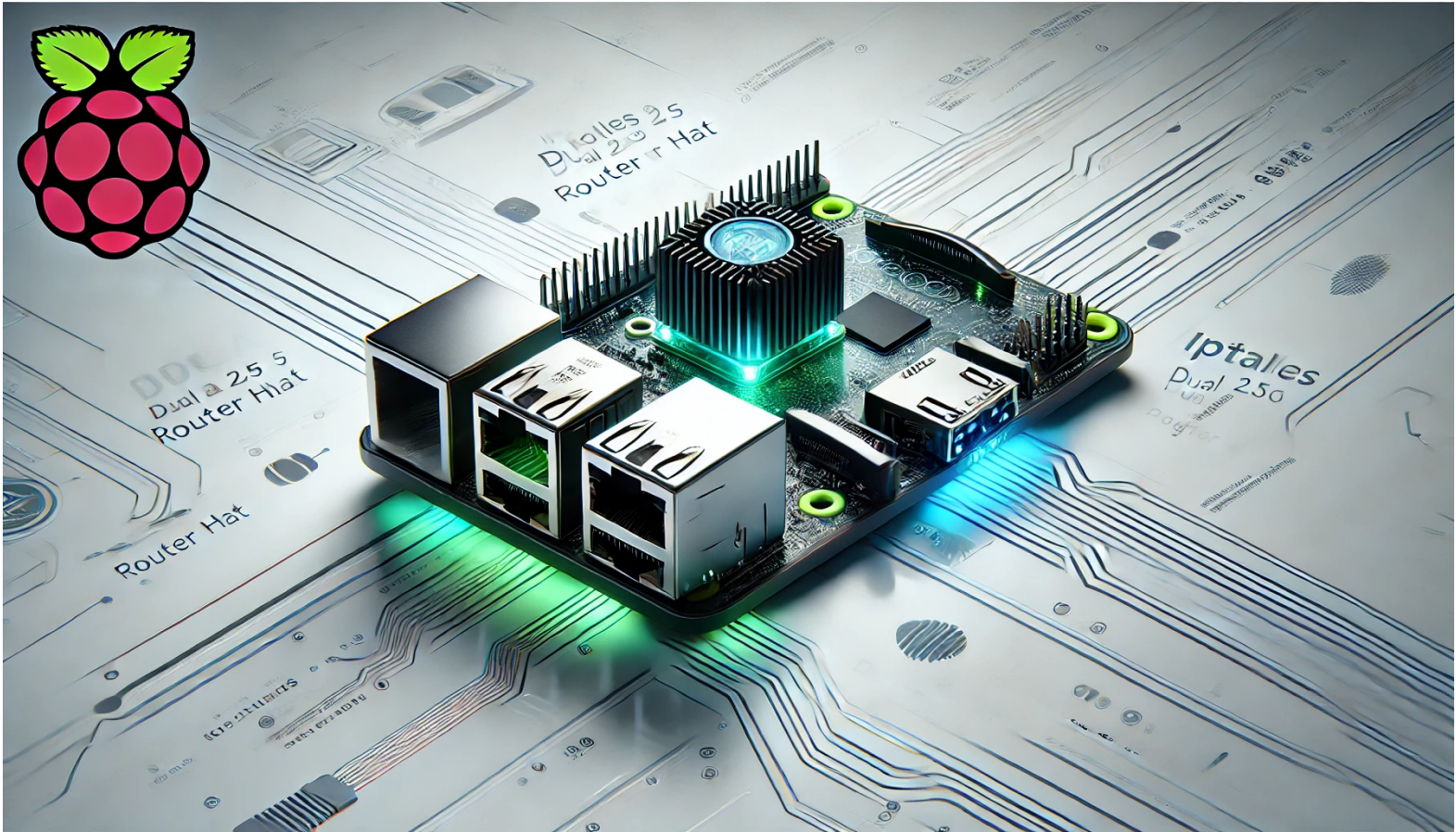


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BUILDING A ROUTER WITH RPI5

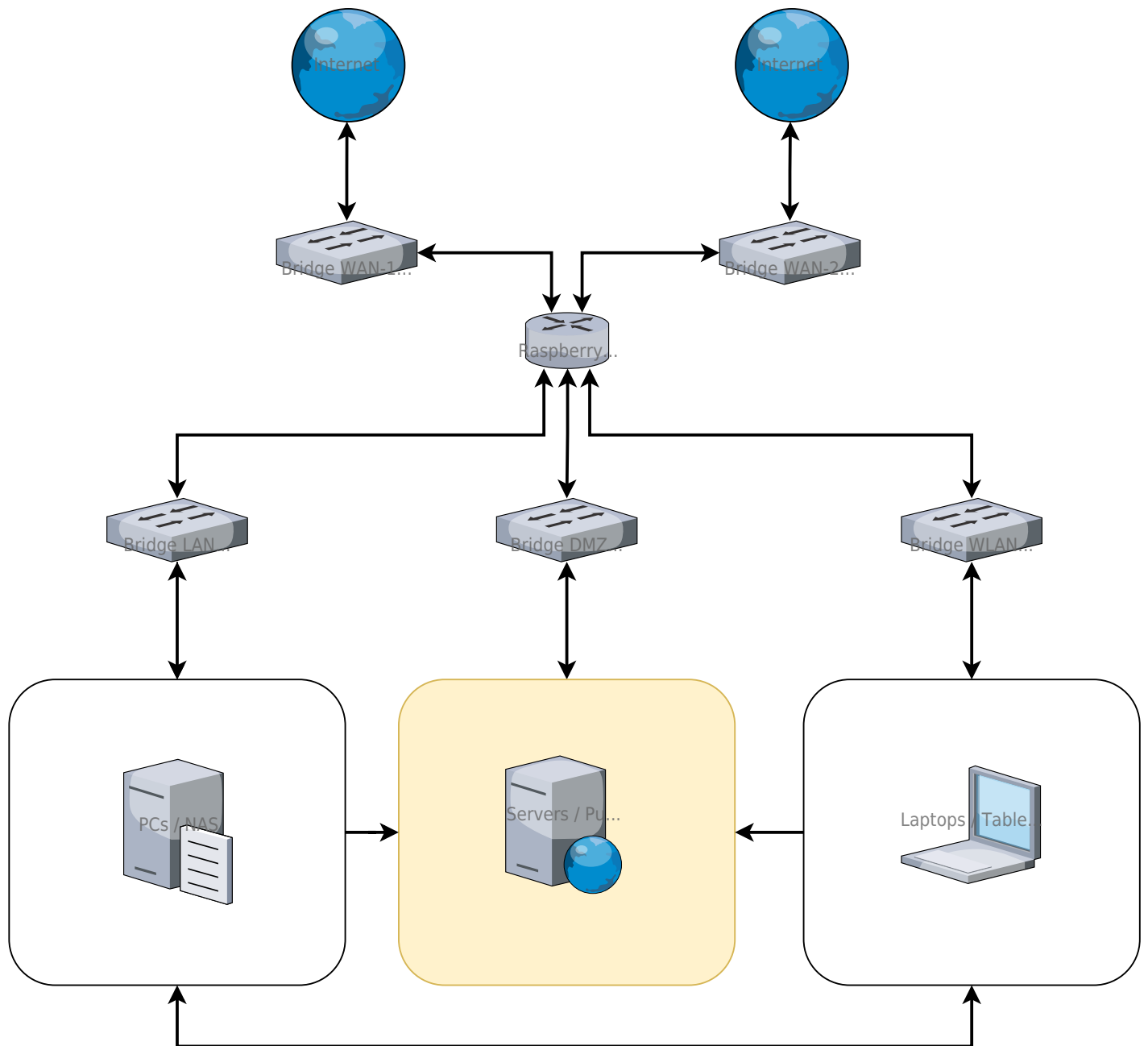
Author(s): Louis Ouellet

A compact, high-performance home/SMB router built on **Raspberry Pi 5** with the **Radxa Dual 2.5G Router HAT**. Runs on Raspberry Pi OS with a lean Linux stack (**ifupdown + iptables + dnsmasq**) and optional services like **Pi-hole**, **Unbound** (recursive DNS), and a **Wi-Fi AP**. The project includes shell scripts and documentation to reproduce the setup end-to-end, including **NVMe migration** for reliability and speed.

FEATURES

- **Three-zone routing:** WAN (`eth0`), LAN (`eth1`), DMZ (`eth2`)
- **Clean networking:** `ifupdown` for addresses, `iptables` for firewall/NAT, `dnsmasq` for DHCP
- **sane defaults:** secure INPUT policy, LAN-only SSH, DHCP/DNS per zone, NAT out via WAN
- **NVMe boot/migration:** scripted SD→NVMe clone, resize, and boot order tweak
- **Optional Pi-hole:** Pi-hole owns :53; system dnsmasq does DHCP + local DNS on :5353
- **Optional Unbound:** local recursive resolver on 127.0.0.1#5335 (DNSSEC, no 3rd-party upstreams)
- **Optional Wi-Fi AP:** guest (routed subnet on `wlan0`) or bridged (LAN extender via `br0`)
- **Idempotent scripts:** re-runnable installers that won't clobber working configs
- **Firewall extras:** examples for port-forward, DNS-redirect, and guest isolation

NETWORK TOPOLOGY



DEFAULTS & BEHAVIOR

- **Subnets:** LAN **192.168.10.0/24**, DMZ **192.168.20.0/24** (guest Wi-Fi **192.168.30.0/24** if enabled)
- **Gateway IPs:** LAN **192.168.10.1**, DMZ **192.168.20.1**, Wi-Fi **192.168.30.1**
- **DHCP pools:** **.100-.200** per subnet (configurable in scripts)

- **Firewall:**

- **INPUT: DROP** by default; allow loopback, established/related, DHCP/DNS from LAN/DMZ, **SSH from LAN only**
- **FORWARD:** allow LAN/DMZ→WAN; block unsolicited WAN→LAN/DMZ; LAN↔DMZ blocked unless explicitly allowed
- NAT: MASQUERADE out via WAN
- **Pi-Hole mode (optional):** Pi-hole/FTL on **:53**; system **dnsmasq** on **:5353** serves local zones; Pi-hole forwards **lan/dmz** to **127.0.0.1#5353**
- **Unbound (optional):** Pi-hole upstream set to **127.0.0.1#5335** for local recursion (DNSSEC in Unbound)

QUICK START



Requires Raspberry Pi OS (Bookworm), RPi5 with Radxa Dual 2.5G HAT, and basic console access.

```
# 1) Get the installer
curl -fsSL https://raw.githubusercontent.com/LaswitchTech/router-pi5/stable/install.sh -o install.sh
chmod +x install.sh

# 2) Run base router setup (ifupdown + iptables + dnsmasq)
sudo ./install.sh

# 3) (Optional) Add services later
# Pi-hole DNS front-end
sudo ./add-pihole.sh
# Unbound recursive resolver
sudo ./add-unbound.sh
# Guest Wi-Fi AP (routed)
sudo ./add-ap-wifi-guest.sh
# Bridged Wi-Fi AP (LAN extender)
sudo ./add-ap-wifi-bridge.sh
```



Heads-up: if you already installed Pi-hole, it binds port **53**. The system **dnsmasq**



used for DHCP must be moved to **port 5353** (the scripts handle this). To diagnose conflicts: `sudo ss -ltnp '(sport = :53 or sport = :5353)'`

DOCUMENTATION

Review the [full documentation](#) including:

- **Installation** (router base, NVMe migration)
- **Pi-hole integration** (dnsmasq → 5353, local zones, optional DNS redirect)
- **Unbound** (secure recursion, DNSSEC)
- **Wi-Fi AP** (guest routed vs bridged)
- **Port forwarding & hairpin NAT** examples
- **Troubleshooting** (port 53 conflicts, DHCP scope, PCIe enable on Pi 5)

HARDWARE, PARTS & COSTS

Brand	Part	Vendor	Qty	Price
Raspberry Pi	5 (4-8 GB)	Amazon	1	143.00 C\$
Raspberry Pi	5 Active Cooler	Amazon	1	17.31 C\$
Radxa	Dual 2.5G Router HAT	AliExpress	1	60.68 C\$
Radxa	Power DC12 60W	AliExpress	1	17.89 C\$
			Total	238.88 \$CAD

[Upload](#)

GALLERY

ROADMAP

- Merge add-on scripts behind `install.sh` **flags** (e.g., `-with-pihole`, `-with-unbound`, `-with-ap-guest|bridge`)
- Optional **PHP admin** for templating configs & safe reloads (diff + rollback)
- SQM/CAKE for bufferbloat control
- Support for redundant WANs
- WireGuard site-to-site & remote-access presets
- VLAN templates and multiple SSID support (hostapd multi-BSS)

TROUBLESHOOTING SNIPPETS

```
# Who's using port 53 / 5353?  
sudo ss -lntup '( sport = :53 or sport = :5353 )'  
sudo ss -lunp '( sport = :53 or sport = :5353 )'  
  
# Pi-hole DNS reload + logs  
sudo pihole reload dns  
journalctl -u pihole-FTL -n 50 --no-pager  
  
# dnsmasq status & lease file  
systemctl status dnsmasq  
cat /var/lib/misc/dnsmasq.leases
```

LICENSE & CREDITS

Code and docs are in the repo; see **LICENSE** file for details. Thanks to the Raspberry Pi, Radxa, and open-source communities.

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