Running Python-Based Experiments on Wireless Routers with *Seattle*

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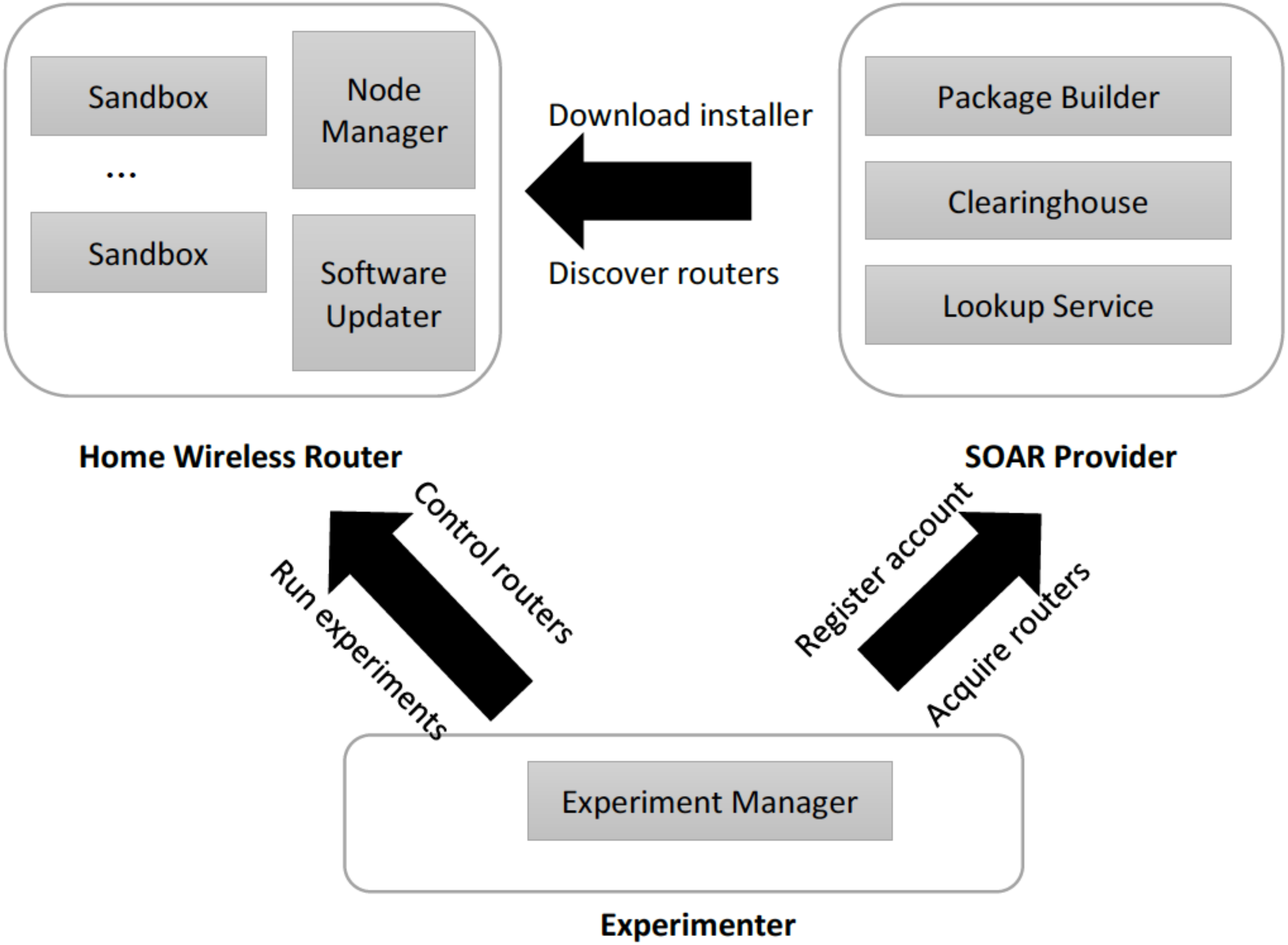
Running *what?*

- Seattle – our testbed software – `https://github.com/SeattleTestbed`
- Cross platform (PCs --> RPis, smartphones)
- High level general purpose programmable
- “Repy” – sandboxed, resource isolated, safe
- Remote controlled
- Can do TCP/UDP
- Run distributed services, computation
- FOSS

Overview of Components



Sandbox

...

Sandbox

Node Manager

Software Updater

Home Wireless Router

Download installer

Discover routers

Package Builder

Clearinghouse

Lookup Service

SOAR Provider

Run experiments

Control routers

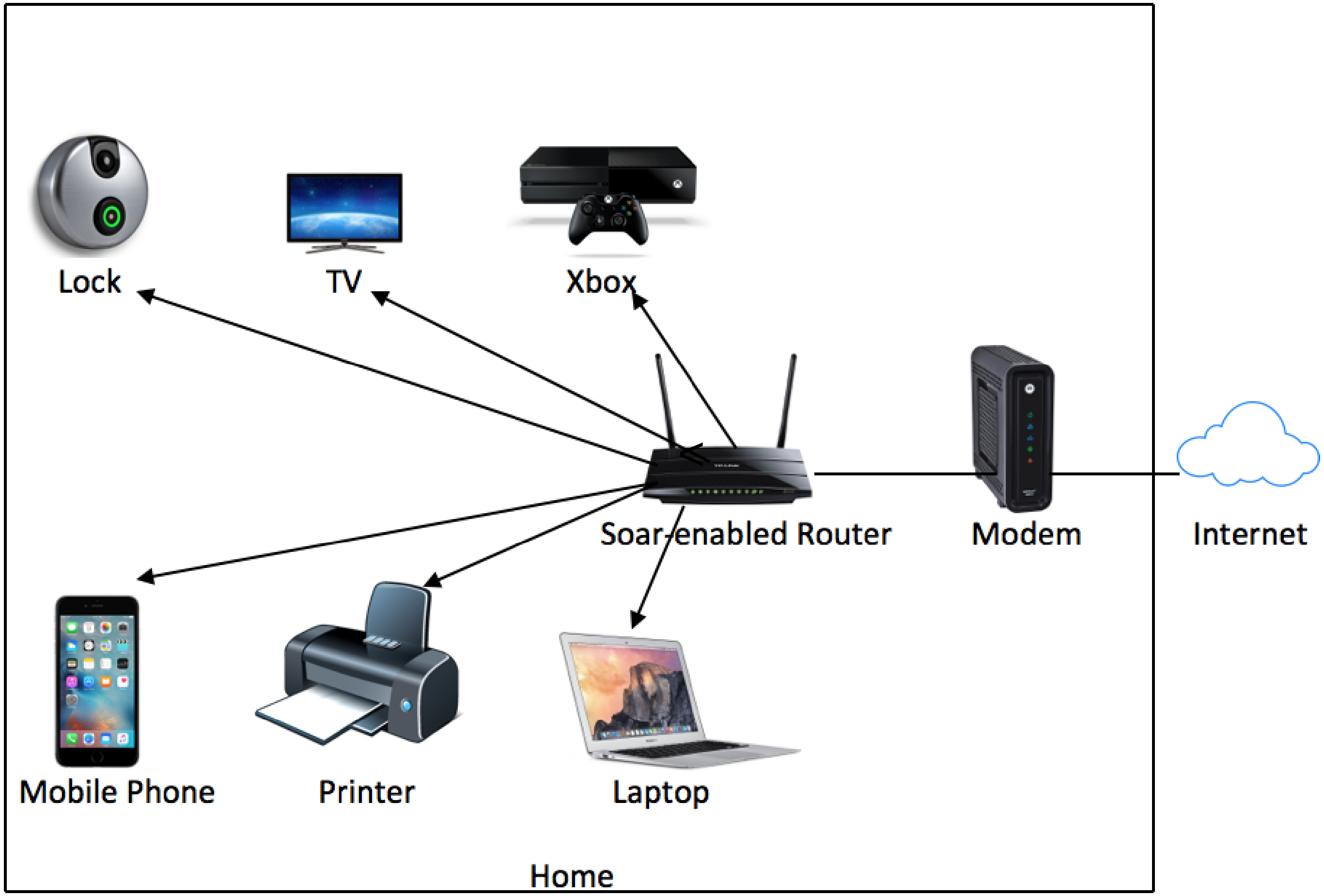
Register account

Acquire routers

Experiment Manager

Experimenter

A Possible Deployment



- Or just have the Seattle device as yet another host on the private network – like RIPE Atlas

Obstacles, Workarounds

(Despite portable software base – runs on Nokia N800, Android, PCs with Linux / Mac / Win)

- Tiny router memory and flash
- User management, `busybox cron`
- Custom installer packaging

- Think hard before you `fork()`
- Don‘t cache `.pyc` files
- `ln` all the things
- `extroot`, swap

Sandbox Extensions

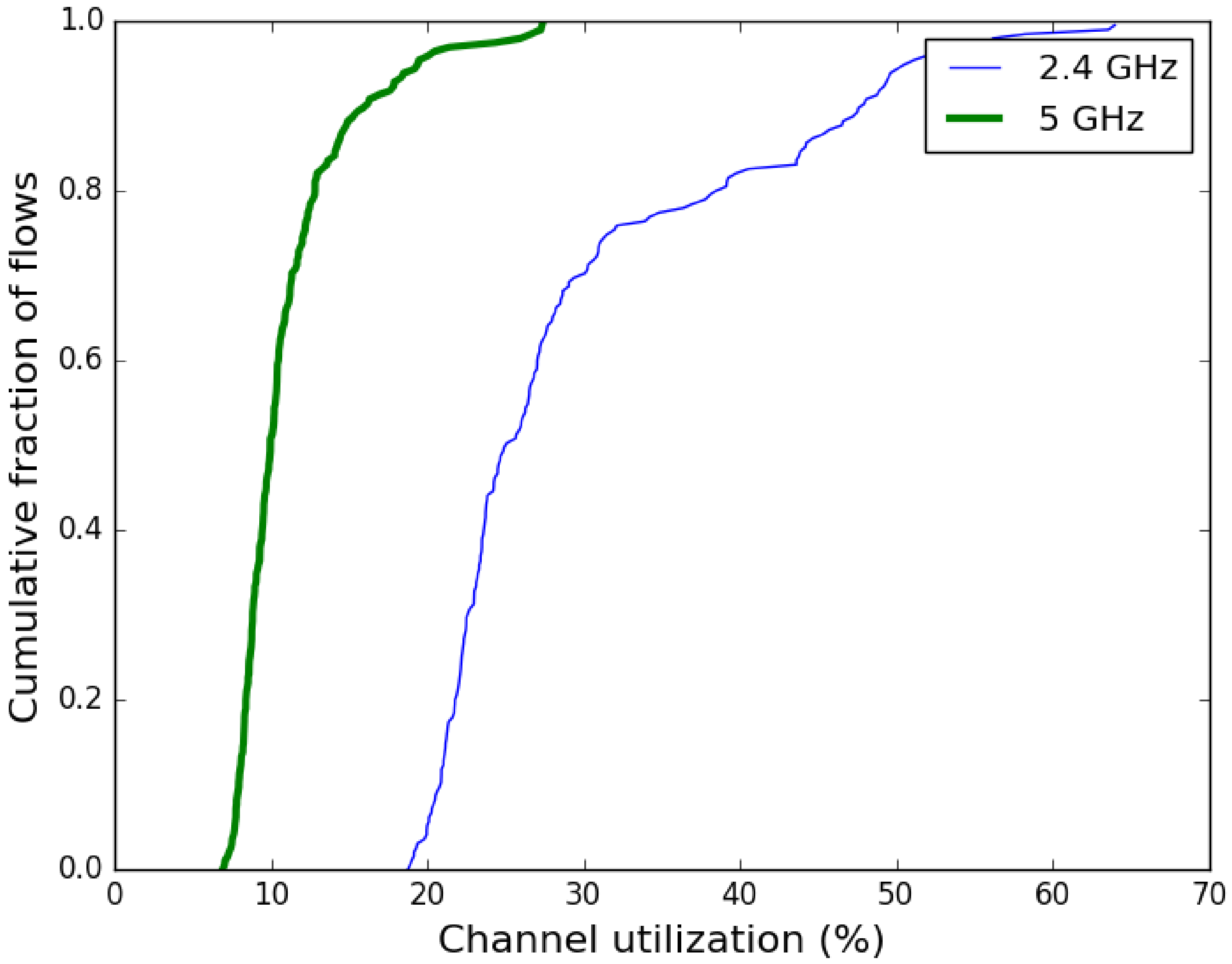
(i.e., things that are not part of the default Repy sandbox API.)

- `ping`
- `traceroute`
- `iw`, `ip` for various interface stats (sorry Clauz!) – Obfuscation for scanned WLAN MAC addresses
- Software firewall – don‘t mess with private network

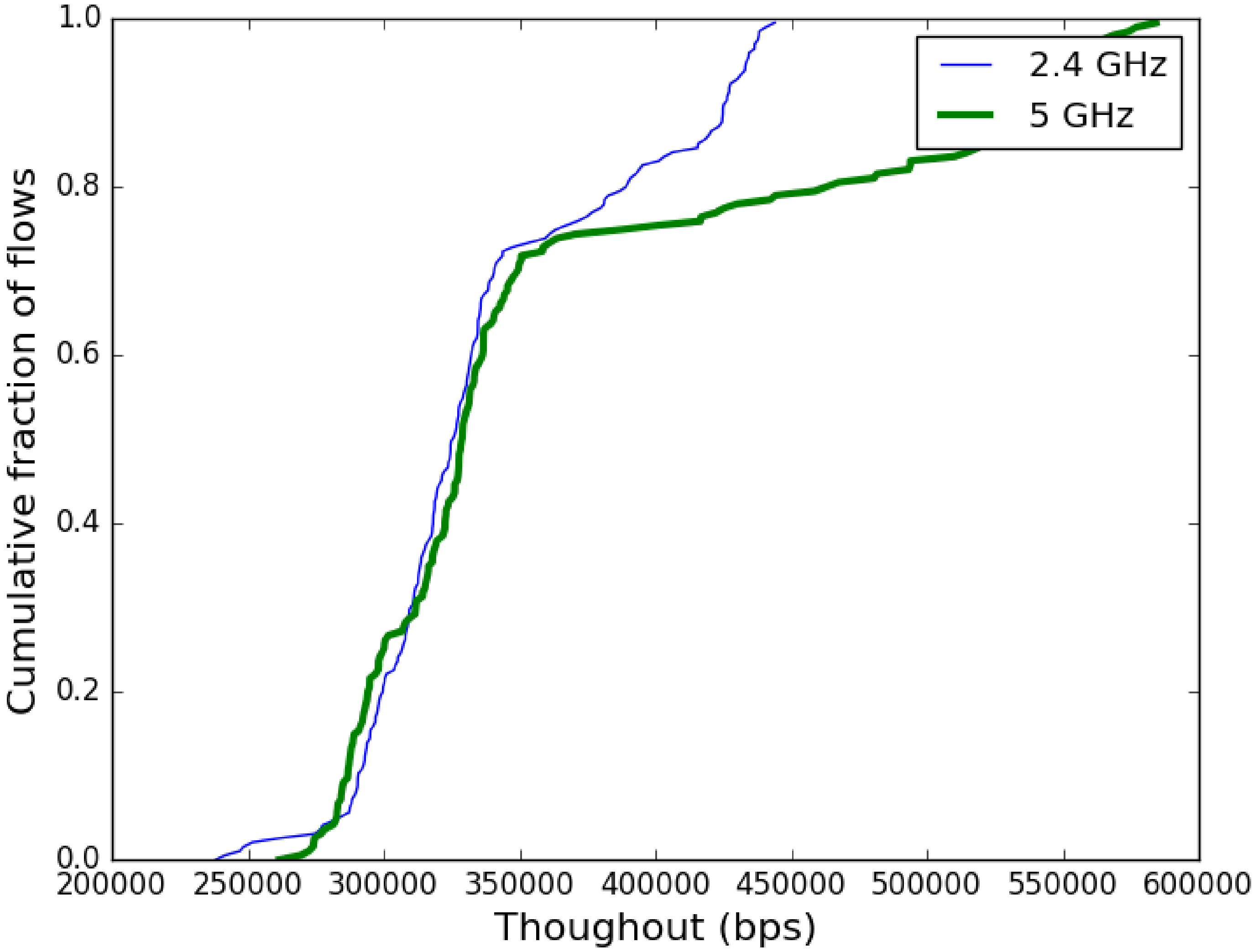
Experiment Setup

- TP-Link TL-WDR3600
- 560 MHz MIPS CPU
- 8MB of flash
- 128MB of RAM
- Dual-band wireless interface
- NYC, residential and office buildings

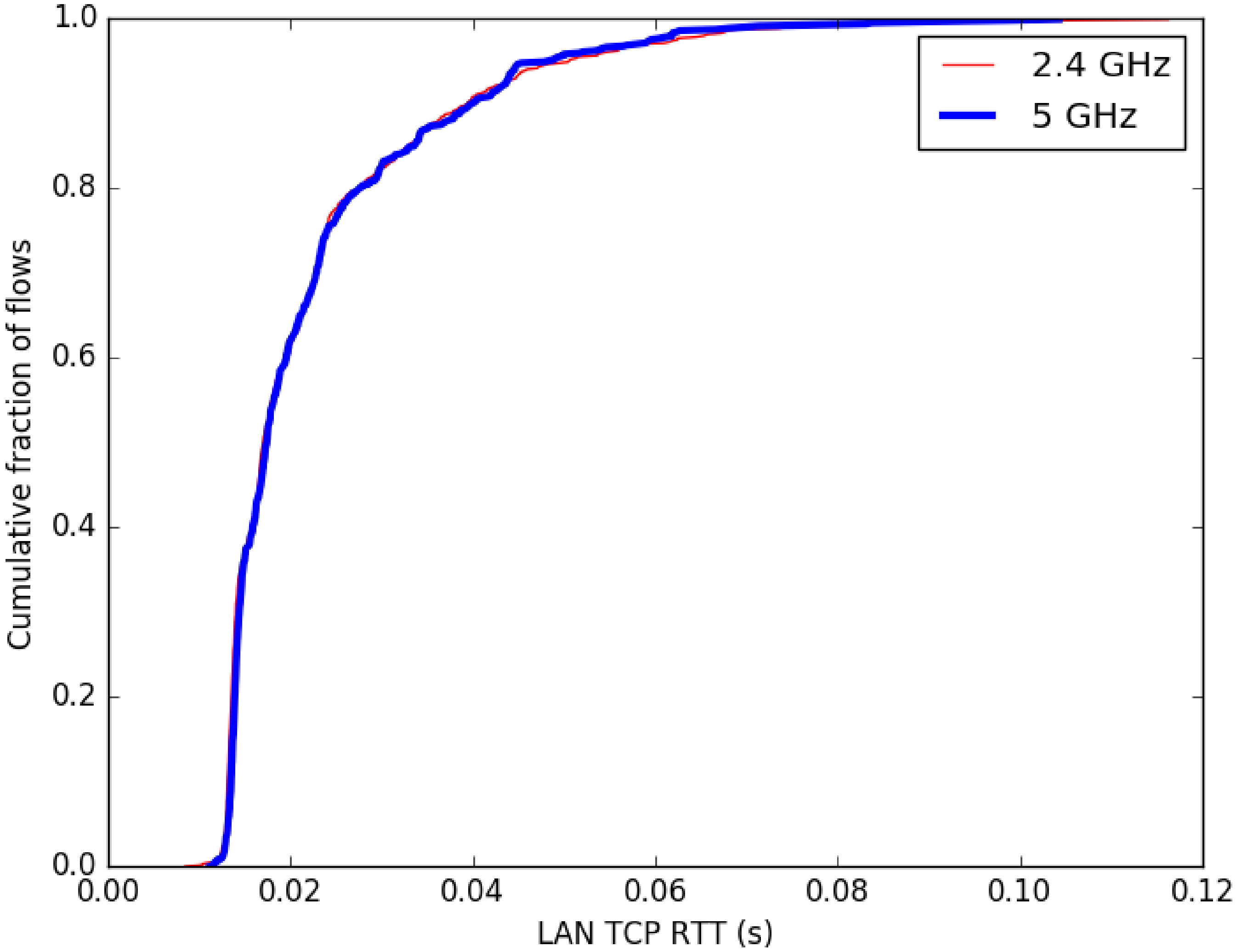
So what happens when you use this? (1)



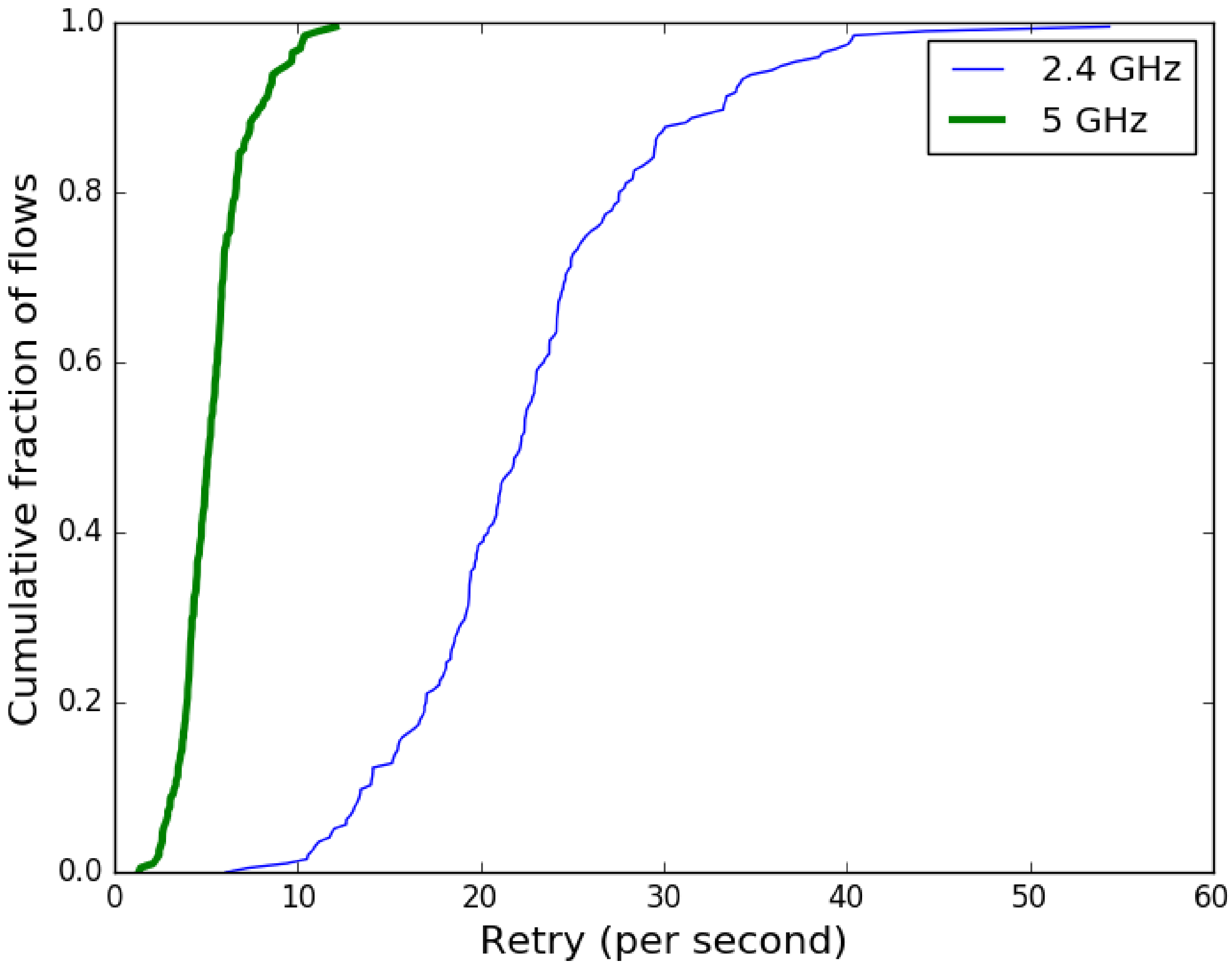
So what happens when you use this? (2)



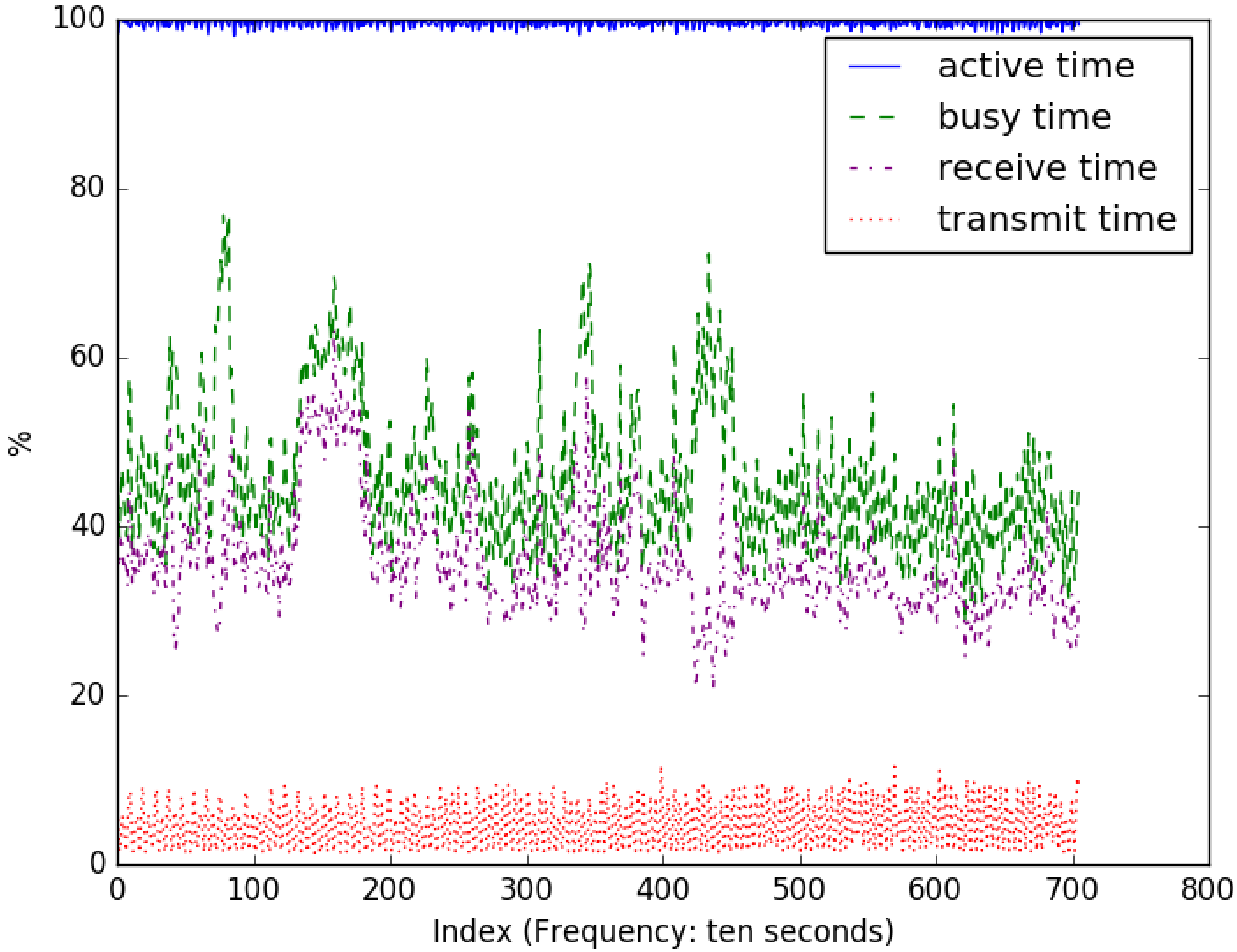
So what happens when you use this? (3)



So what happens when you use this? (4)



So what happens when you use this? (5)



Concluding Remarks

Porting to OpenWrt:

- Challenging!
- Rewarding!
- Good fun!
- Everything is so small!

Seattle:

- Reusable components
- Cross-platform
- FOSS

That‘s all – thanks!

My PGP key fingerprint:

`C104 3B76 6D2C 8196 3D62 ...`

`...AE41 B9A8 D2A4` **`9038 2EC8`**