XLX Multi-protocol System

An implementation of a remote AMBE server

K8OI - Jan 2024

Background, Challenges & Purpose

Background

Why XLX?

- Hotspots are growing like mushrooms; almost anyone with a digital HT will have some form of HotSpot
- PC access using a ThumbDV devices is available for DMR, D-Star, and YSF
- Digital Mode protocols are not natively interoperable
- XLX provides a Cross-Mode solution for DMR, D-Star, and YSF
- XLX access is “built in” to HotSpot for each Mode
- XLX uses hardware (AMBE Encoder/Decoder) for D-Star > DMR & YSF > D-Star
- XLX uses software for DMR > YSF > DMR

Challenges

Why do I choose these things?

- AMBE decoder for D-Star requires HARDWARE
  - Hardware limits Datacenter hosted XLX Server capabilities
    - YSF & DMR will work (software); D-Star requires Hardware device
  - AMBE server requires Hardware for the OS and the ThumbDVs
  - AMBE server requires network connectivity to the XLX Server
- Network @ Home
  - Port Forwarding can (and does!) work - until your IP address changes!
  - ISP’s are not fond of residential “service” hosting

Purpose

Why spend blood & treasure? It's a fun hobby!

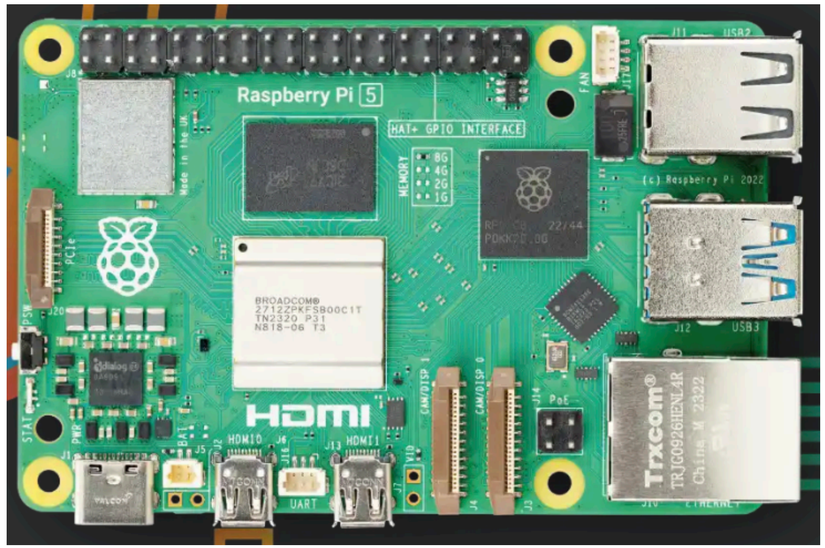
- Enjoyment of learning; I've always wanted to build a multi-protocol system
- Promotion of our hobby, education, and community support
- Creation of Virginia focused **Cross-Mode** Repeater "Modules"
- Available to anyone in Virginia/DMV who'd like to chat with their digital "neighbor"
- A way to bring a true "Digital" collaborative "Net" experience regardless of preferred digital Mode
- This project was a side project - I was initially trying to develop a WireGuard VPN solution for D-Star gateways with limited/expensive internet access; helping reduce Internet costs for trustees/clubs - yep, I figured that out too… But back to this…

The Journey

Pieces & Parts

Stuff I had, stuff I bought, stuff I rent

Northwest Digital ThumbDV

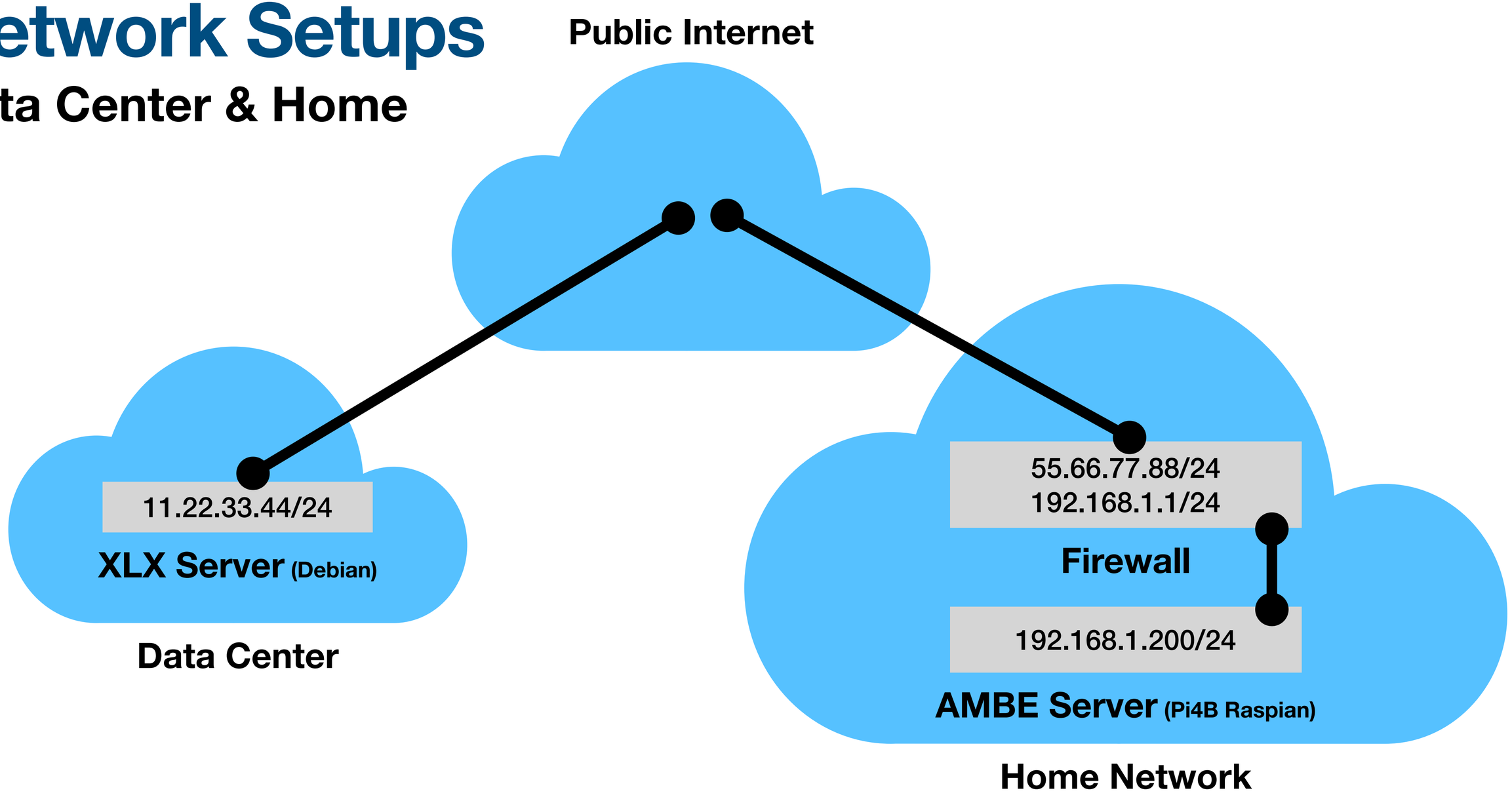


Raspberry Pi-4B

Cloud Hosted Server

Network Setups

Data Center & Home



Stuff Notes

- XLX Server
  - Fixed, public facing IP address
  - Debian OS
  - Installed XLX Server
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The Destination

References

- **K8OI GitHub Repo**: https://github.com/k8oi/xlx-wg-ambe-vpn
- **Northwest Digital ThumbDV**: https://nwdigitalradio.com/products/thumbdv™
- **XLX Installation**: https://n5amd.com/digital-radio-how-tos/create-xlx-xrf-d-star-reflector
- **WireGuard Configuration**: https://miguelmota.com/blog/getting-started-with-wireguard
- **AMBE Configuration**: https://github.com/n5amd/ambed-debian-installer/