



# Freifunk in the USA

**Leveraging Community Organizations to Build  
Neighborhood Wireless Networks**

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# Introductions

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# Disclaimers

- The Columbia Heights Neighborhood Network has not been built yet.
- However, last year I came here and told you there would be a hackerspace in DC.
- HacDC exists today (see [hacdc.org](http://hacdc.org))
- The CHNN Phases I & II will be complete by Shmooscon
- NYCWireless is already there



# If you remember nothing else...

- Build wireless networks that *actively engage the community* where you live
- Sustainability should be built into the process
- Partner with nearby organizations, engage them through service, training & collaboration
- Applied knowledge = \$\$\$ = paying the bills
- Bridge the digital divide
- Free beer is an unsustainable model



# Outline of the talk

- Where other networks have failed & succeeded
- Technical overview
- The Columbia Heights Neighborhood Network
  - The “accidental” wireless network & HacDC
  - Phase I: Building the stable point of presence
  - Phase II: Building community through technology
  - Phase III: Extension strategies (freifunk)
- Design patterns for replicating where you live
- Q & A



# Traditional Methods



# First Attempts



# Patterns of Community Wireless

- Free Wireless 1.0: “Cantenna, etc.”
- Civic Wireless 1.0: “Pilot Projects to Nowhere”
- Mesh 1.0: OLPC, etc.
- Civic Wireless 2.0: Taxpayer supported uplinks
- Freifunk/Free Wireless/Mesh 2.0
- Unintentional: The AirCrack Generation
- Community Wireless: Bridging the digital divide



# Quick Technical Overview

- Multiple Protocols – Multiple tools to get the job done.
- Alphabet soup of standards to many to list.

Two most popular:

- WDS - Wireless Distribution System
- OSLR - Optimized Link State Routing Protocol



# Crowd Sourcing?



# Issues



# OSLR

- Optimized Link State Routing protocol
- Finds a path to the cloud
- Easy(usually) to setup, great with multiple end points
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- Problems
- Current version doesn't do link quality checking
- We only have one exit point



# WDS Protocol Issues + Bonus!

- 50% use 50% overhead bandwidth issues when using a AP to bridge to AP.
- Single point out to the internet.
- Make sure you got the bandwidth
- Really easy to setup on the AP's.
- In our setup not much router configuration except the subnet.



# Where other networks succeeded

- Networks (or adverse conditions) inspired hackers to build the hardware and write the software necessary
- Helped establish WiFi as a tool necessary for technical development efforts (i.e. OLPC)
- Encouraged partnerships between hackers, governments, non-profits and ISPs
- Established Wi-Fi as a “public good”



# Where other networks have failed

- Nobody to pay the bandwidth / budget cuts
- Nobody to fix what broke or replace downed network and human nodes
- Failed to engage the non-technical users and stakeholders who benefit from the network
- Failure to integrate better ideas, keep up with the best ideas and advances in technology
- Eclipsed by commercial efforts



# The “accidental” wireless network

- In a nearly century-old building with 8 other community organizations
- Used community WiFi to explain “hackers”
- Church officials shelved wireless network plans a few weeks after we signed our lease
- “Enlightened interest” IT infrastructure upgrades and tech support for our neighbors
- If we're going to do it, we're going to do it right



# Phase I: Building a stable base

- Physical Base: Rebuild the Layer 1 IT infrastructure through comprehensive re-wiring
- Funding Base: Funding through lowering costs
  - Replace multiple low-bandwidth links with fat pipe
  - Replace multiple POTS lines with VOIP
  - Replace need for a security guard
- People Base: Making friends through providing services, training, tech support, savings.



# Building Wireless Network

- What do we need to get basic coverage.
- Walls of IRON AND broken souls prevent signal propagation
- 8 AP's running OpenWRT or Tomato(My favorite for out of the box eye candy)
- 1 router running IPCop (I like easy out of the box)
- Every building tenant is wired, local (low power) routers for office wireless



# Phase II: Community through technology

- Once the base is established, the community network “builds” around community wireless
- Single external wireless network for the community around the church
- Provide training and support through community events targeted towards users within the network range
- Provide computers, routers and other physical resources for extension & experimentation



# Phase II: Technical Details

- Utilizing free(donated) to cheap(ebay) WRT54G/S/L routers (and OpenWRT compatible)
- OpenWRT and WDS package.
- Powering units with PoE on the roof.
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- QoS, Packet Shaping, Splash pages with info about HacDC



# Phase II: Tweaking

- Begin with an open network (perhaps a splash screen.)
- Monitor network traffic
- Provide analysis at periodic meetings, reports
- Warn against potential abuses, allow time for self-policing
- Adjust network policies to achieve the best QoS as agreed upon by the user community



# Next Step.....Sigh...



# Phase III: Extend the Network

- “If you build it, they will come.”
- Encourage independent experimentation to extend the main network
- Find new points of presence for extending the main network
- Encourage users to extend the network, attaching mesh, bridgets, etc. to the central managed network
- Place new nodes where need exists



# Design Pattern to Take Back Home

- 1) Build communities first, networks second
- 2) Find/Build a solid, sustainable base of operations (and a way to pay for it)
- 3) Bring in users and stakeholders before building the network
- 4) Let the users take ownership of their network, provide training & assistance
- 5) Provide more than just free wireless and more will come to the network



# Contact information

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