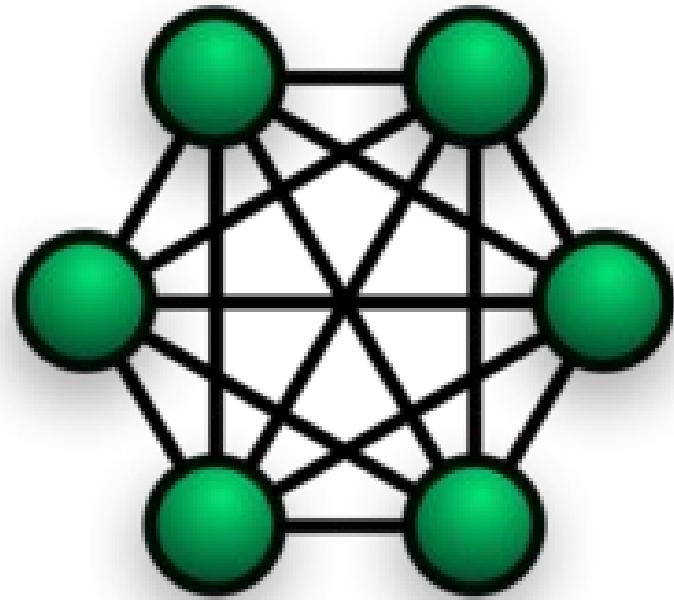
 **sudomesh**

#NSA KILLED MY INTERNET



NOW I HAVE TO BUILD A GNU ONE

# Why mesh networks are rad



1. Decentralized.
2. Resilient.
3. Community-owned communications rooted in the commons.

# **Use Cases!**

# Disaster Relief

Red Hook Initiative WiFi  
#SandyAid Txt Map

New Map      Browse All Maps

1 Events/Announcements    2 Repairs    3 Supplies

Drag / Click to Map

Format TEXT as Need @ Your Location  
(i.e. "Gas, Water Pump @ Van Brundt and Pioneer Brooklyn")

Filter Landmarks

- Event
- Memories
- Alert!
- Fix This
- Free WiFi
- Friend
- Group
- Food
- Coupons
- Jobs
- Other

Landmarks      Chat Feed

**Red Hook Needs**

Needs/Reports added to the map when texted.

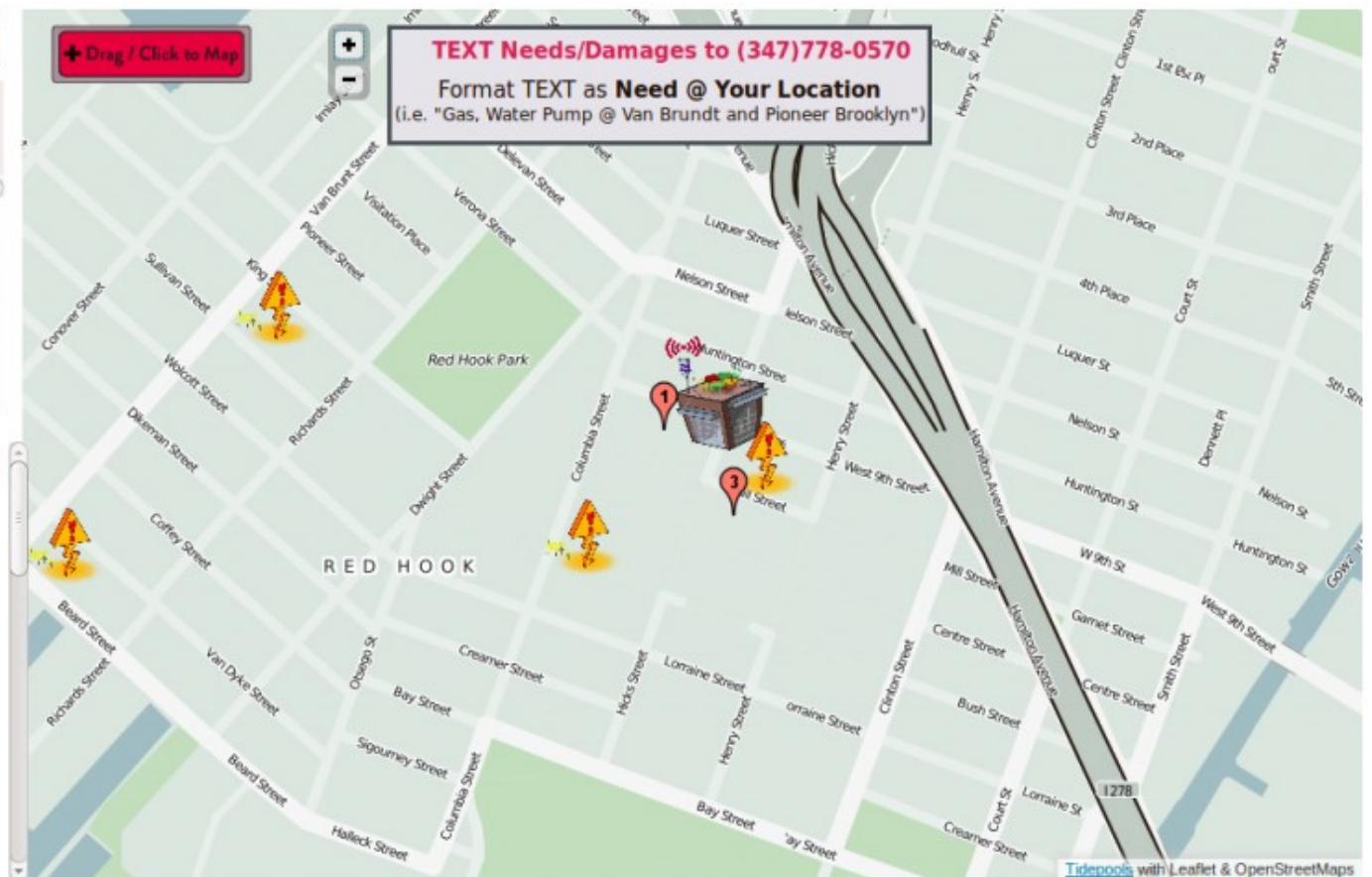
**RESPONDERS: Click on Icons to Send Reply Back via Txt Msg**

(Get JSON API here) - Part of [tidepools.co](#)

1 . Red Hook Initiative  
767 Hicks Street Brooklyn, NY 11231 Phone  
718-858-6782

11:51pm 11-11-2012

A



# Off-grid connectivity

- **Build peer-to-peer communications networks in places where reception is poor or nonexistent:**
  - Crowded festivals, like Burning Man & Symbiosis
  - Remote villages in unconnected or difficult-to-reach areas around the world
  - Pooling funds and sharing a single satellite connection with many people

# Be your own ISP!

- Find a building already lit up with fiber connectivity.
- Pool funds to buy a fast commercial connection
- Use high-speed wifi to distribute bandwidth between the rooftop nodes (the backbone) and

# Share your internets!

- Share a portion of your existing bandwidth locally.
- Encourage others to participate and share their connection as well
- As others join the mesh, shared bandwidth expands to cover a whole city...

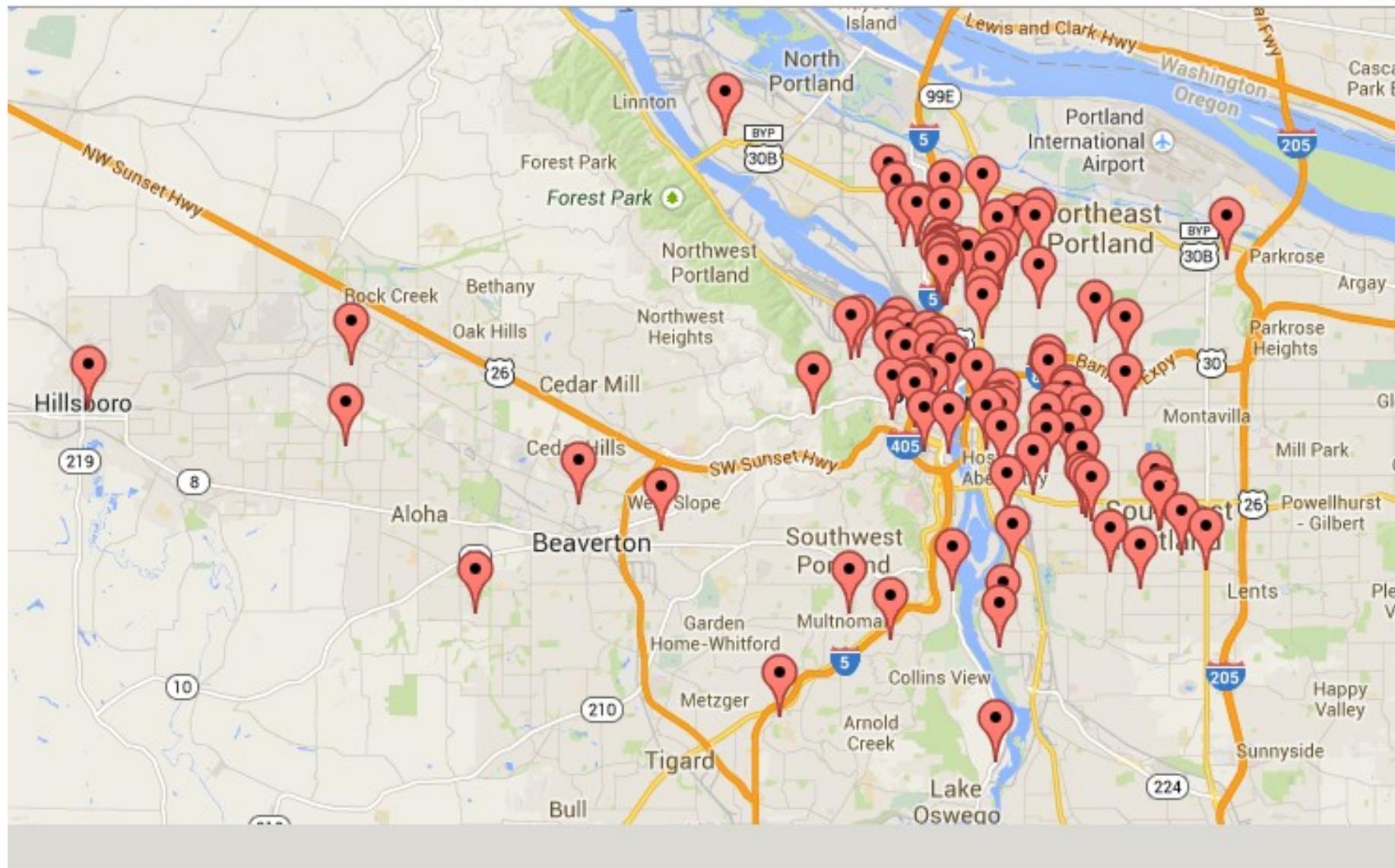
# Sensor networks

- Internet of Things is happening
- Consumer products are aimed at the home
  - Intelligent lightbulbs, Intelligent smoke alarm
- Mesh expands IoT to the public sphere
  - Community garden “water me now” sensors
  - Which community spaces are open now?
  - Air pollution / sound pollution monitoring
  - Gunfire triangulation

# Hackerspaces Worldwide



# Personal Telco node map (Portland)

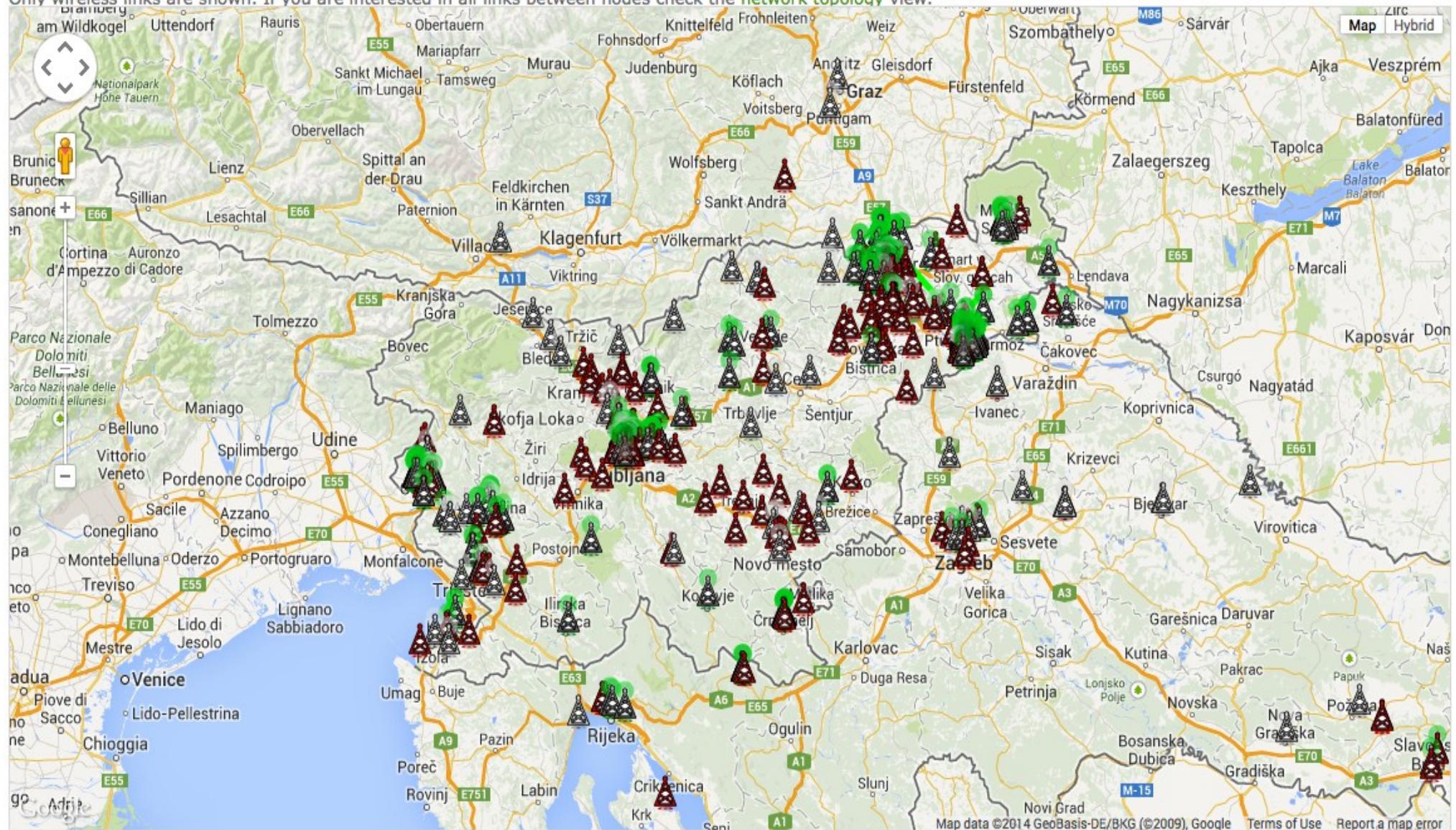


# rooftop mount in Portland



# wlan slovenija node map

Only wireless links are shown. If you are interested in all links between nodes check the [network topology view](#).



# painting antennae in Slovenia



# Freedom Tower in Zuccotti Park



image courtesy of Matt Cutugno

(<http://staythirstymedia.com/201111-063/html/201111-cutugno-occupying-my-thoughts.html>)

# hackathon + mate in Argentina

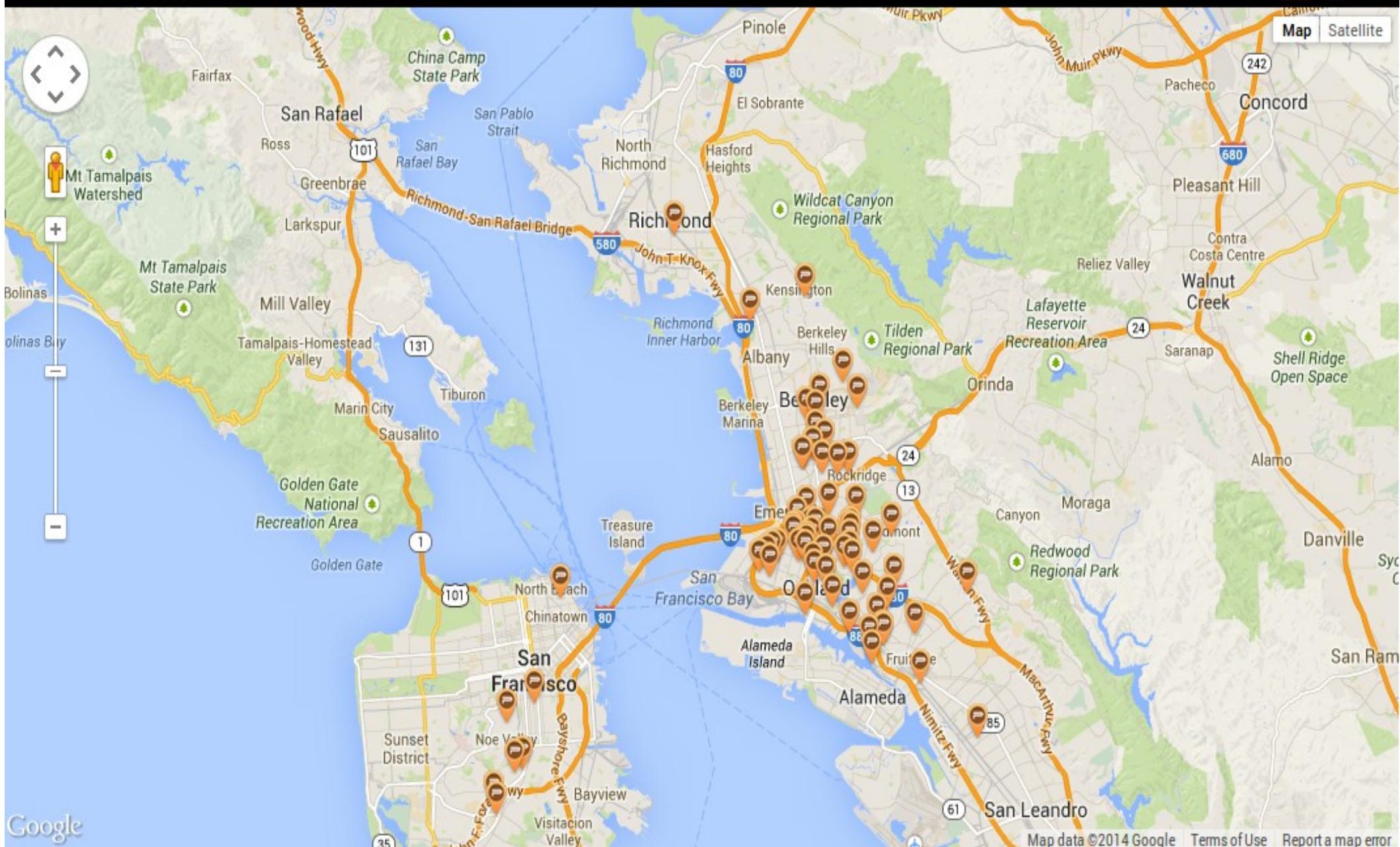


# mounting Commotion routers in India



# People's Open Network

- Founded in 2013
- Based out of Oakland, CA
- All volunteer run community grass-roots project
- All free and open source software + documentation
- Spent the last two years developing firmware
- Beta test network became active last month
- Currently expanding beta network
  - Join our monthly community meeting <http://sudomesh.org/>
- Seeking more beta node operators in the east bay
  - Sign up on <http://map.sudomesh.org/>



# Always seeking more volunteers!

There are lots of ways to participate in building a community network. Any given network needs:

- Networking geeks and radio-heads
- Community organizers (human network relations)
- Designers and software developers
- People who like to climb buildings... ^\_^

# Three types of mesh nodes

- Home nodes
  - Cheap (~\$50) indoor-only base unit
  - Shares your Internet
  - Short range (1-2 family home). Omni-directional. Both 2.4 + 5 Ghz.
- Medium range extender nodes
  - Street-level access points for phones / laptops
  - Mount on outside of home or point it out a window
  - Multi-block range. Semi-directional. Either 2.4 or 5 Ghz.
- Long range backbone extender nodes
  - These form the high-speed backbone of the mesh
  - Mount on rooftops, flagpoles or antenna towers.
  - 20+ mile range. Highly directional. Either 5 Ghz or 900 MHz.

# mounting a rooftop node in Oakland











# Bootstrapping a mesh

- Problems with bootstrapping
  - Few nodes == no mesh
  - No mesh == no incentive to join
  - Rooftop mounting is intimidating / more expensive
- Solutions
  - Make nodes connect to mesh via internet (tunnel)
  - Nodes provide safe internet sharing
  - Provide cheap indoor routers to get people's feet wet
  - Nodes provide extra private access point for owners

# Safer internet sharing

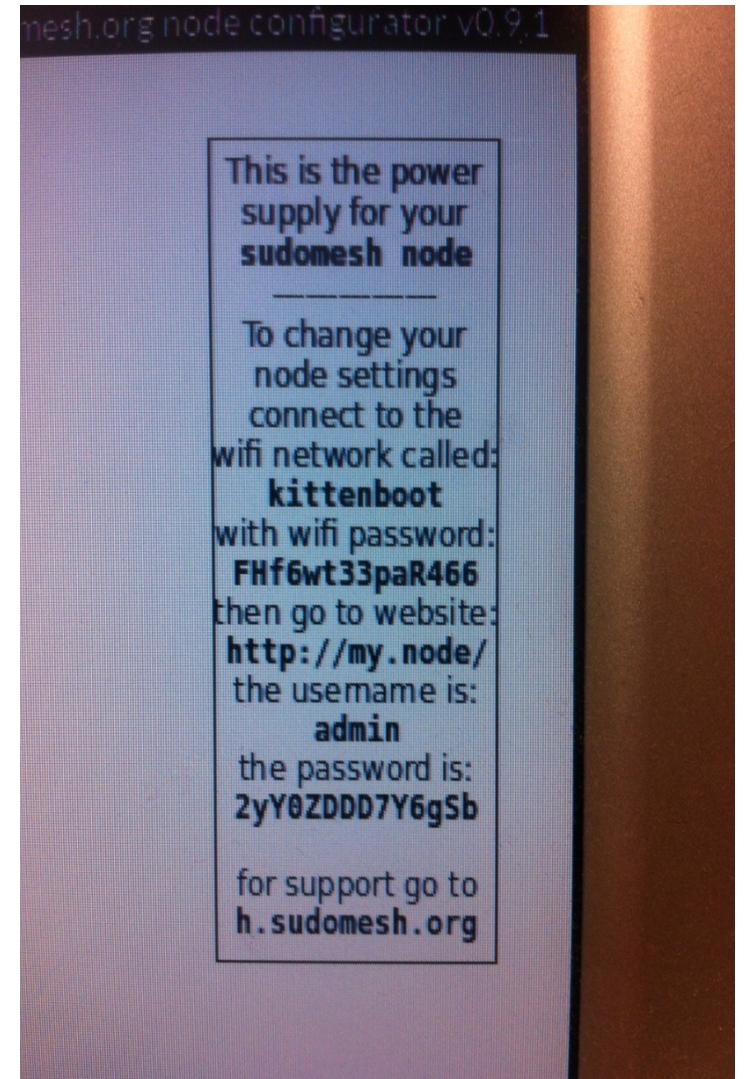
- User-selectable automatic bandwidth limiting
  - Share *up to* a limited portion
  - Still use 100% when no-one else is using bandwidth
  - Still share 100% when you aren't using bandwidth
- All traffic from mesh is VPN'ed
  - VPN server owned by shell non-profit
  - Abuse complaints received by shell non-profit
  - No logs: “Sorry we can't tell you who pirated this movie”

# Every node has three wifi networks

- Mesh wifi network
  - Node-to-node connectivity.
- Public wifi network
  - Connectivity for normal phone/laptop devices
- Private wifi network
  - Password protected. Node owner sets password
  - Isolated from public/mesh networks
  - Unlimited access to own Internet connection (if present)
  - Buying a new wifi access point? Why not mesh?

# Logistics

- Make it easy to buy pre-configured nodes
  - User provides initial bandwidth limits, private wifi password, etc.
- Automated flashing / configuration of nodes
- Automated printing of:
  - “How to care for your node” guide
  - Sticker with password and support info
- Inventory / fulfillment infrastructure



# Limiting centralization

- Network is separate from mesh organization
  - Mesh Network: peoplesopen.net
  - Mesh Organization: sudo mesh
- Joining network only requires agreeing to the Nearly Free Network License
- Make mesh organization fork()'able
  - Document EVERYTHING!
  - Open source everything.
    - Website. Wiki. Legal documents. Software. Firmware.
  - Make it easy to fork and rebrand.
  - Encourage forking for geographic expansion

# Free and Open Source

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sudo mesh v0.1 (Snow Crash)  
based on OpenWRT 12.09 (Attitude Adjustment)  
-----
```

"See, the world is full of things more powerful than us.  
But if you know how to catch a ride, you can go places."  
-- Neal Stephenson, Snow Crash  
-----

# FCC Lockdown?!

- There's a current FCC proposal to lock down wireless routers by requiring vendors to "ensure that only properly authenticated software is loaded and operating the device." This has huge implications for community networks in the US, with similar rules being discussed for the EU and Canada.
- While the proposal has been on the table since early 2014, it has only recently come to the attention of the hacker community - thanks in large part to a presentation and discussion that took place last month at BattleMesh v8 (an annual conference/competition testing open source wireless mesh networking protocols).
- Submit public comments to the FCC by October 9<sup>th</sup>!

# **Get involved!**

## **Join!**

Join a local mesh network!

Ask your local hackerspace:

<https://hackerspaces.org>

## **Initiate!**

Start a local mesh network!

Talk to us: [info@sudomesh.org](mailto:info@sudomesh.org)

## **Events**

### **Battlemesh**

(spring equinox, Oakland, ca)

Int'l Summit for Community Wireless Networks

