Community wireless networks - yesterday's technology tomorrow

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What's a community network?

- "Wireless community networks or wireless community projects are the organizations that attempt to take a grassroots approach to providing a viable alternative to municipal wireless networks for consumers."

- Many models, e.g.,:

  - "VNO": open access, common SSID

    - however, open APs decreasing ("child porn enabler")

  - cooperative: reciprocal access

  - single site: e.g., park; one access link

  - facilities-based: city-scale, mesh network

Status snapshots

- Lots of single-site (one backhaul) networks

  - cafes, parks, universities (e.g., Columbia)

  - getting easier with multi-antenna or radio-only APs

- Small city networks: Oulu, Finland; Gallatin, TN, ...

  - NYC: Bryant Park

- Reciprocal networks: FON

What are the goals?

- Not always clearly articulated
  - Provide (indoor) cheap high-speed Internet access to underserved communities
    - alternative to dial-up, DSL, cable
  - Make downtown more attractive
    - Cities that can't get a Starbucks
  - Provide outdoor mobile communications
    - alternative to cellular data (if available)
  - Stick it to the Man (Phone Company)

Technical problems

- Dense urban areas:
  - extremely hostile outdoor RF environment
    - see our earlier paper
- Suburbia: house separation > AP reach
- Rural areas: high cost of backhaul
- Mostly doesn't work in cars
- Mesh network bandwidth severely limits capacity (1/hop count)

Legal & security

- VNO: Unclear legal status of link sharing

- Possible AUP issues

- Harder to provide

User & usage problems

- Discovery - many visitors won't know SSID
- Devices - few handheld 802.11 devices
  - Few need to stand in middle of sidewalk
- Often doesn't work reliably away from street windows or street level
- Bandwidth
  - mesh networks < 1 Mb/s user
    - = below $20/month DSL

Business & ops problems

- Hard to maintain large network with volunteers
  - stringing up APs gets boring after a while
- Who pays for Internet bandwidth, AP maintenance, 24x7 NOC?
- Cheap DSL in cities limits charging
- Cheap minutes for voice makes VoIP unattractive

What's to do?

- Cooperative rural WISP
  - WiMax, LTE or point-to-point 802.11(n)
- Cover small areas (CBD)
- Work with municipial networks
- Campus roaming agreement (eduroam)
- > 100 Mb/s mesh links
- Wait for 450 MHz spectrum...
  - see Finland