The Mesh Potato

• The Problem
• Village Telco
• B.A.T.M.A.N.
• Demo
• Lets build a Mesh!
• Mesh Potato
• Memes
Cities of the Future
Village Telco Goals

- Small Telco business for 2nd or 3rd world
- Self sustaining business (viral growth)
- Scalable up and down
- Business for a reasonably geeky entrepreneur
- $5,000 Capital
- 6 months break even
- Grounded in business (not tech or charity)
Village Telco Components

- Mesh Potato
- B.A.T.M.A.N.
- Gateway Server with Billing System
- Entrepreneur
- Up stream VOIP and PSTN
- Modest Capital
- Business Model
Village Telco Kit

Server

SuperNode

40 Mesh Potatoes
Dabba

- dabba.co.za have a prototype Village Telco network in actual commercial operation
- Orange farm, township near Johannesburg
- uses commodity hardware and open source software
- free local calls
- pre-paid vouchers for calls to other networks
Village Telco and Cell Phones

- Call Cost
- Community Approach
- Unlicensed Spectrum
- Infrastructure cost and availability
- Cell Phone networks don't scale down
- Capital (it's not just the handsets)
- Walled gardens versus the Internet
B.A.T.M.A.N.

- Better Approach to Mobile AdHoc Networking

Adhoc

Infrastructure
Advantages of Mesh Networks

Extended range over Infrastructure mode
Mesh Network Problems

- Unstructured
- Unreliable Medium
- Dynamic changes
• Distributed intelligence
• Every node knows: Available nodes, total metric towards each destination and best next hop for each destination
• No information about the full routing path is necessary. Works well as nodes come and go.
• Works well in practice (e.g. 500 node Freifunk network in Berlin)
Demo

- 3 node mesh
- Running on commodity wireless hardware
- Next Hop information
- Mesh adapting to changes
Let's Build a Mesh

wget http://rowetel.com/batman_demo.txt

- x86 Linux user mode daemon
- Not all Wifi drivers will work in Ad-hoc
- Choose a random 10.0.0.0/8 IP (e.g. 10.1.2.3, 10.20.21.22, 10.x.y.z)
- Internet connectivity
Village Telco Challenges

- Ease of customer and billing management
- Cost of Access Points
- Range of WiFi Phones
Projected Cost: USD 60 per unit
Mesh Potato Design

- Low Cost, SoC
- Maximum use of existing Open components
- OpenWRT
- MadWifi on Atheros (Ad-hoc problems)
- CPU load (Asterisk, Speex Codec, Oslec Echo Cancellation)
- FXS port interface
Software

- OpenWRT
- MadWifi
- B.A.T.M.A.N.
- Asterisk
- Speex (GSM)
- Oslec
Mesh Potato Plan

- What we have done
- What's next

M1 Software
M2 Hardware
M3 Beta
M4 Production
Open Hardware

- Designing exactly the hardware we want
- Community based development (many eyes and skill sets)
- Partnering with commercial companies for volume manufacture
- Good Business (IP04)
- Opportunities for novel business models
- Completely open and keeping it that way
Africanisation

- Design for real world problems based on field experience of Village Telco team
- Static electricity on antenna
- Reverse polarity on DC connector
- 240VAC connected to DC connector!
- Wide range AC adaptor (350VAC)
- Humidity, rain, hail, connector weatherproofing
- Lightning protection on FXS port
Memes

• Cell Networks (closed, strong licensing, high cost/bit) versus the Internet (open standards, unlicensed, anyone can connect, low cost/bit).

• Community ownership versus big business or government

• Development: Many good projects have been ruined by money

• Voice is the killer application. Once voice network is deployed we have built an Internet backbone
Memes

• 60% of all calls are local (value without upstream connectivity)
• Mesh Potato useful outside of Village Telco
• Very Very Open
• The future for many is the township
• You and I are going to help them get connected
Links

- Village Telco Google Group
- shuttleworthfoundation.org
- villagetelco.org
- manypossibilities.net
- open-mesh.net/batman
- dabba.co.za
- rowetel.com