

# MujeRed project

Building the women's network



# *MujeRed* project



*Mujer* + *Red* = Women + Network

The goal of the project is to provide the advantages of FREE mobile Gsm communication to a community of women in Poneloya, a small seaside town in Nicaragua, CA.

# Why this 'reverse discrimination'?

(Only women will be receiving the benefit)

- It may boost women's micro-enterprise
- It is a 'weapon' to defend against domestic violence
- It will help to reverse some stereotypes, eg. "woman use telephone only to chat", "technology is for men"
- Phone may be handed to children as an emergency device to prevent abuse



# Technical solution - Startup phase

Technology used will be a single-site, 'network-in-a-box' deployment of OpenBTS, powered by Range Networks OpenCell hardware.



# Terminals

Beneficiaries will be provided with regular, 'plain' Gsm phones plus a custom Sim card.

We plan to start with about 150 terminals.



# The network

A 5 km range will be covered by this setup.

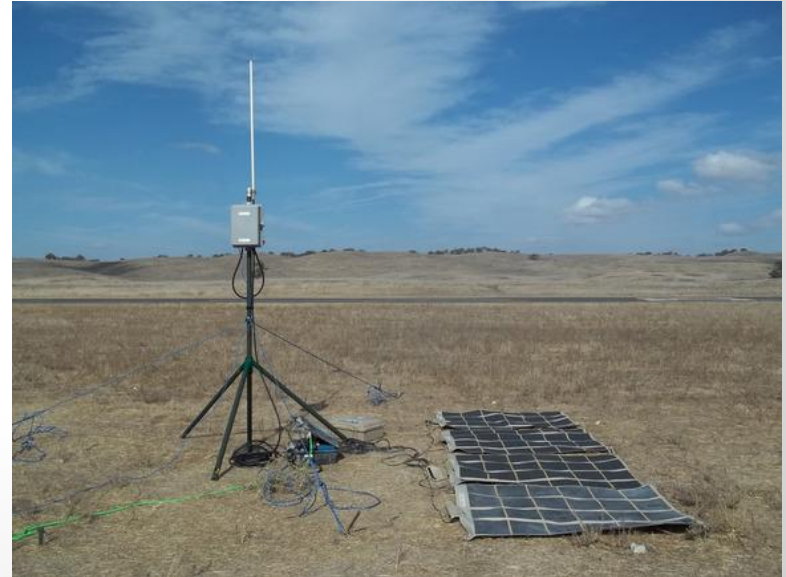
Maximum concurrent calls will be 35, limited by hardware design. In order to prevent network congestion, call duration may be limited.

SMS communication will be unlimited.

# Site selection

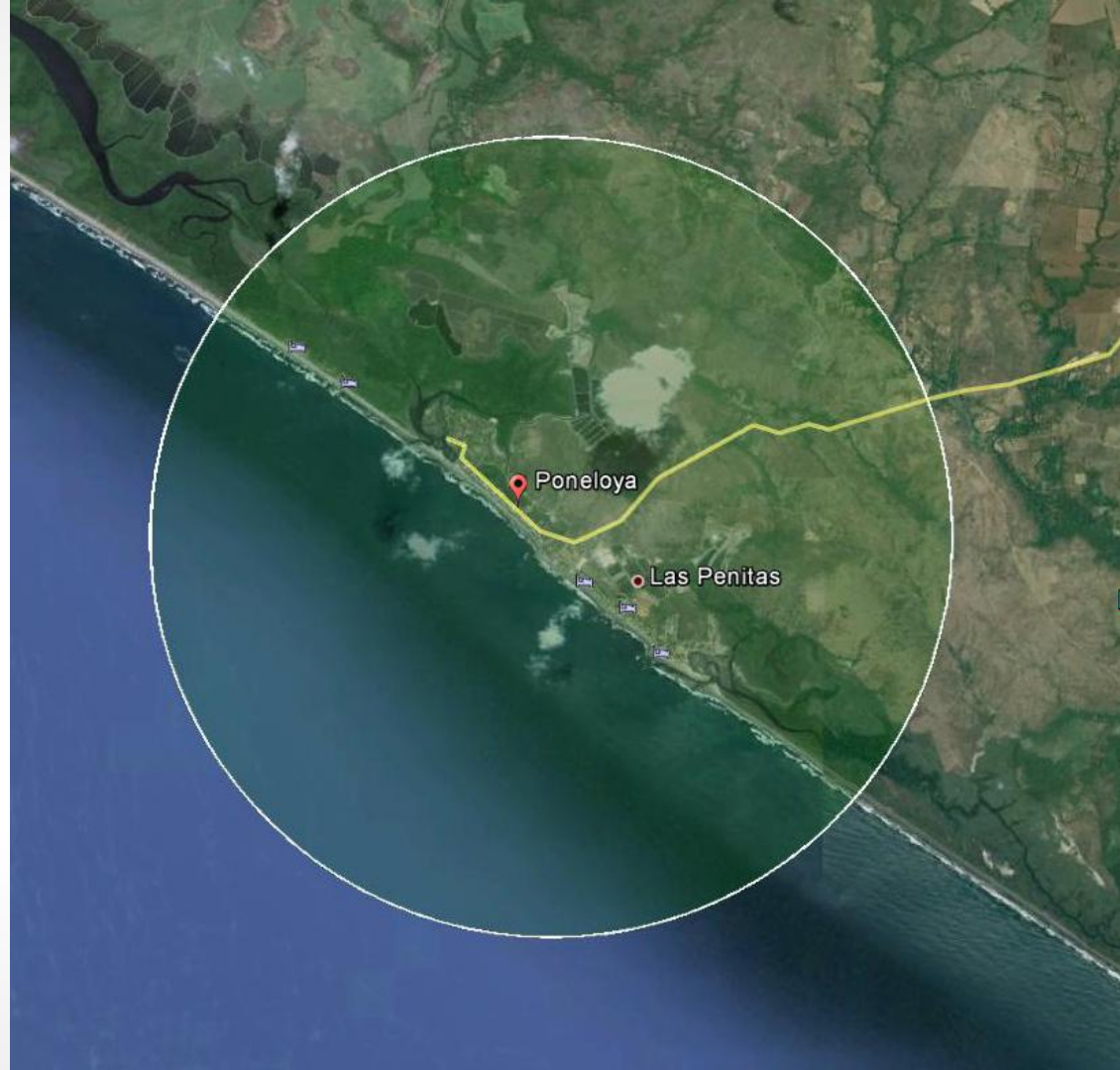
Hardware + antenna will be placed on an existing tower mast at local police station. Power requirements will be minimal.

Part of the hardware may be solar powered.



# Coverage map

The green circle represents the 5 km range of an omnidirectional antenna, centered at planned installation site. Even if the site is virtually flat, actual signal propagation may differ.





# Usage

Beneficiaries **WON'T BE CHARGED** for voice/sms services, nor for the terminals. Calling regular landline/cellular numbers won't be possible though. An emergency number will be provisioned, connected to an analog phone at the installation site (Poneloya police station).

# Features and limitations

- The system will be a 'pbx-style' closed network: phones will be provisioned with numbers like 5001, 5002, 5003, etc.
- External calling won't be possible
- Lawful intercept can be implemented
- The system will be accessible 24\*7\*365, even in case of power grid outage
- The system won't interfere with Claro/Movistar's service in any way because it will be using different frequencies (900-1800 Mhz)
- The national TLC regulatory agency, *Telcor*, should grant us a special license for using the band
- Budget constraints may force us to only provide Sim cards to be installed into pre-existing phones, not the phones themselves

# Costs

To be defined!

[around 16.000 €]

# RF dangers

Beneficiaries will be informed about the potential safety hazards of human exposure to radio-frequency (RF) energy, which is radiated from phones, cell phone towers, household equipment, power lines, etc.

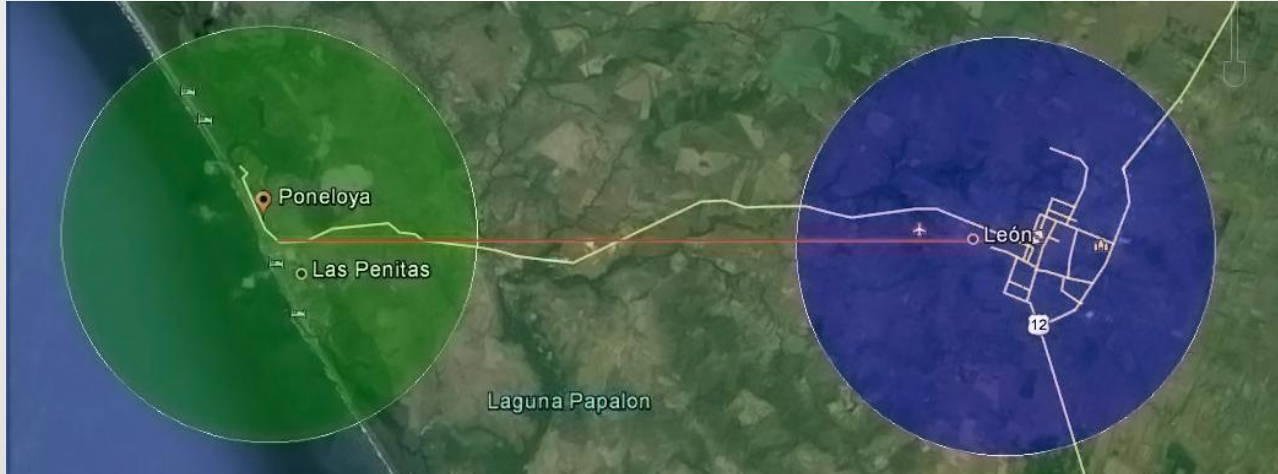


# The next step...

Would be to expand the network to the closest city, Leon (17 km east).

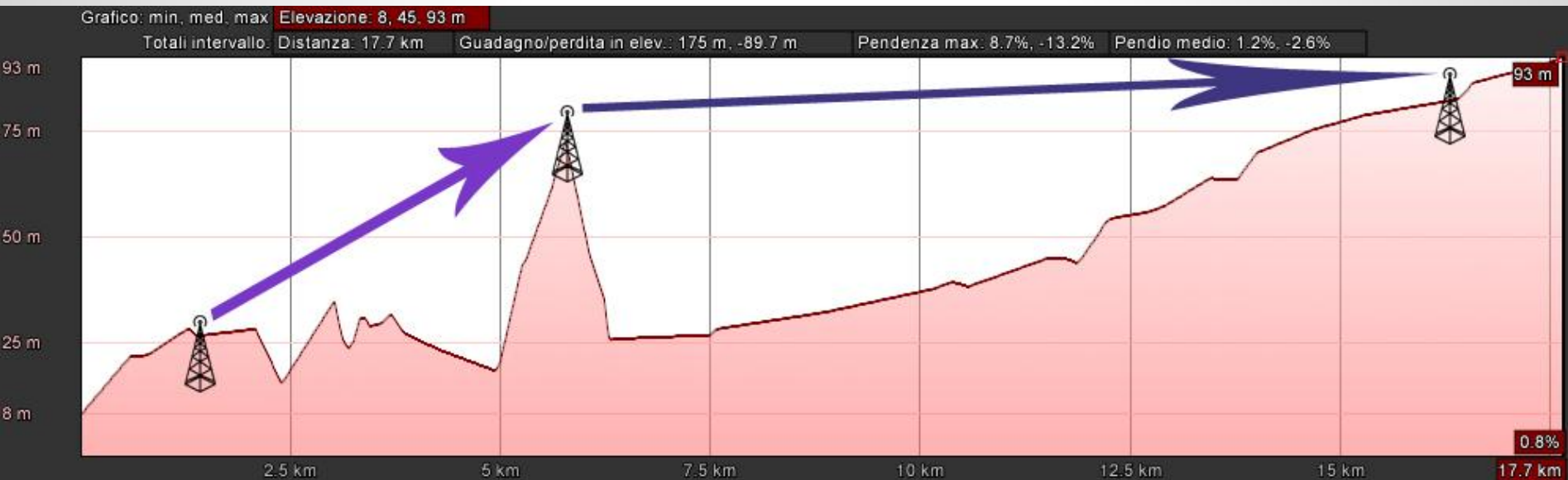
Hospital, markets, mayoral and governmental offices, etc. reside there.

IP backhaul would be based on long range Wifi technology. The two cells would be seamlessly integrated, and beneficiaries will be able to place calls between Leon and Poneloya. Logistic advantages would be enormous, but this will definitely interfere with Claro and Movistar business.



# Poneloya - Leon elevation map

The radio backhaul would consist in two 'line-of-sight' legs of approximately 6 + 11 kilometers. Kilometric wifi IP links are now faisable with inexpensive hardware, eg.: Ubiquity Networks Airmax gear. Also in this case we can feed hardware with solar power and batteries.



# *More info about OpenBts*

*“[OpenBTS.org](http://OpenBTS.org) is an open source software project dedicated to revolutionizing mobile networks by substituting legacy telco protocols and traditionally complex, proprietary hardware systems with Internet Protocol and a flexible software architecture”*



# Why a Free GSM Network?

Big players in mobile business are not interested in deploying services over remote, sparsely populated areas, as return on investment would never properly compensate their tremendous overhead.

OpenBTS can fill this logistical gap.



# Why a Free GSM Network?

- Security

People at sea can seek help by using their traditional cell phone--at no charge.

- Building communities

Rural inhabitants not yet reached by a cellular network or too economically disadvantaged to afford it can enjoy the benefits of mobile communication.

# Why a Free GSM Network?

- Compatibility with pre-existing terminals (cell phones).

Any traditional cell phone can connect, place/receive calls, send/receive SMS over the OpenBTS radio interface

# Why a Free GSM Network?

- Custom functions.

As we fully control the network we can implement any custom function we desire:

- SMS alerts in case of weather-related emergencies.
- Toll free calls to some special numbers such as mayoral or governmental offices, hospitals, etc.

# Advantages of Free Software

OpenBTS GSM stack is FREE software running on Linux's FREE operating system.

It emulates GSM network layers 1, 2, 3 for use with traditional terminals (phones).

It dramatically simplifies service deployment and decreases implementation time and cost.

# Hardware requirements

Any modern PC or laptop can run OpenBTS.

For example:

Dell Optiplex 7010

Intel i7 processor, 4 gB ram

=> USD\$700

# Radio HW for use with OpenBTS

Several hardware vendors provide the radio interface for OpenBTS:

- Ettus Research
- Fairwaves
- Nuand
- Range Networks

# “The Open Philosophy”

Open source philosophy is now being applied to hardware as well, letting the community be involved in designing and enhancing the ‘hard’ part of technology.

# Open “Software Defined Radio”

The Ettus Research radio interface chip design is ‘open’. Anyone can download, modify, and use it for any purpose, even commercial.

S.D.R. dramatically reduces the costs in implementing complex radio systems such as GSM.



# Free software + SDR

Open source software plus the flexibility of SDR gives the chance to build and maintain a small GSM network for about

**One Tenth** the cost of using a traditional carrier's infrastructure.

# GSM Features

A single-cell network with sufficient power can reach a terminal within a 30 km (18 mi.) radius. This means that a single site deployment of OpenBTS could cover even medium sized rural cities, provided there are no natural obstacles between the phone and the antenna.

# OpenBTS Features

- GPRS data
- Handover between multiple cells
- Call encryption
- Free software (no licenses needed, no terminal limitation)
- Can run on any modern PC

# What OpenBTS CAN'T Do

Without a connection to the national telephone network, OpenBTS just provides a 'closed' PBX-style environment: phones are provisioned with numbers like 5001, 5002, 5003, and so on. Users can just place calls and send SMS to each other.

Even emergency services will NOT work!

# Frequency Spectrum Licences

Almost anywhere in the world, GSM frequencies (850 - 900 - 1800 - 1900 MhZ) are regulated by governmental bodies. Their rules read: “You have to pay lots of money in order to use them”.

Sometimes the regulatory agency may grant special licenses for research/humanitarian use.

# In summation

- OpenBTS + Radio can provide GSM service in remote, rural areas.
- The simplest setup may cost less than USD\$2,000.
- Typical power consumption of the BTS may be less than 100 W.
- Providing the inhabitants of a rural area with phones may cost less than USD\$15 per terminal.
- One can grant FREE access to the 'home network', for any service (voice, sms, data).
- One can grant access to the regular PSTN network (the area must be reached by PSTN services and regular fees will apply).
- We can develop our custom services (emergency SMS, voicemail, etc.).
- All ideas are welcome!