VoIP- 4D
Free Telephony Project

Making IP Telephony Accessible in developing regions

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Agenda

- Motivations
- Two Initiatives, one common goal
  - VoIP for development (dissemination, advocacy)
    - First Edition (December 2006)
    - GK3: VoIP 4D Second Edition
    - GK3: A pre-study of innovative approaches
  - Free Telephony Project (open hardware design)
- What is next?

Why a VoIP primer?

- Lived in Tanzania in 2004
- Found two challenges
  - Knowledge not available local languages
  - Low cost IP infrastructure (data and voice)
- Found existing proprietary solutions not flexible enough

VoIP-4D Primer (First Edition)

- Released in December 2006 http://www.it46.se/voip4d
- 40 pages introduction to VoIP
- Focus on “do it yourself” vs Buying a product
- Pedagogical approach vs Lists of commands
- Targets both technical and non-technical readers (advocacy)
- Focus on developing regions “problems”

VoIP-4D Primer

- Translated to English, Arabic, French and Spanish (wider community)
- Licensed under *Creative Commons Non-Commercial Share-Alike*
- Internet dissemination
- Funded by IDRC under the Acacia Initiative

Dissemination of VoIP Primer

December 4 - 2006: 250 mails to individuals

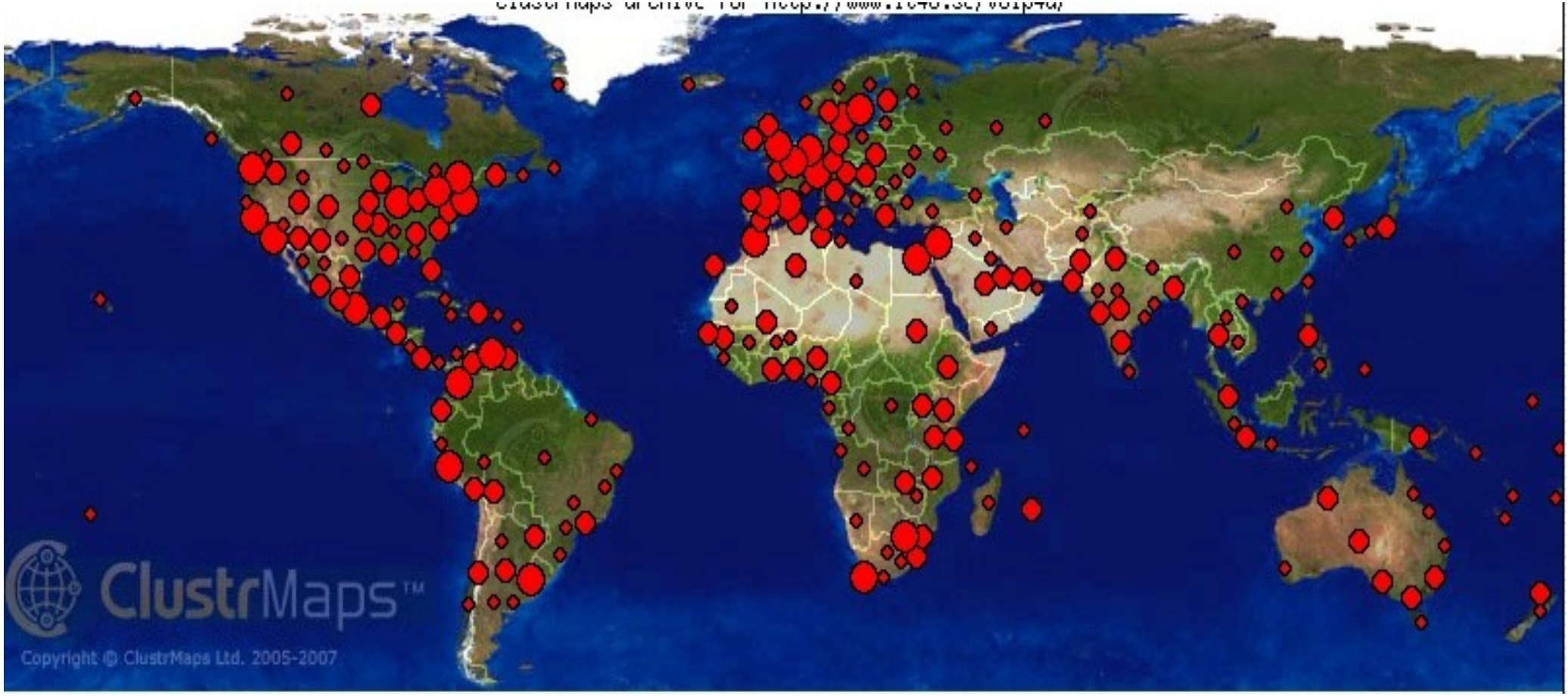
December 11 - 2006: 5700 downloads

- English: 2900 downloads
- Spanish: 1600 downloads
- Arabic: 900 downloads
- French: 300 downloads

December 2007: 100.000+ downloads

- Great interest for Arabic language

The VoIP4D Map



The magic potion (2006)

- **VoIP**
  - Carries telephone conversations as IP packets
- **Open standards**
  - Allows everyone to implement interoperable communication systems.
- **Free and open source software**
  - Learn from existing experiences, integrate solutions and share our results with others

The magic potion (2007)

One year later...

We have open hardware!

The typical question

Why not just rely on Skype, or Google Talk?

The short answer

Flexibility

Ownership

Opportunity

Sustainability

The main component: PBX

- **P**rivate (Automatic) **B**ranch E**x**change.

What?

  - Allows to share one or several telephone lines with multiple users
  - Routes incoming and outgoing phone calls

Who?

  - The owner of the system manages the unit
  - Decides how to share the external phone lines with its users

What is Asterisk?

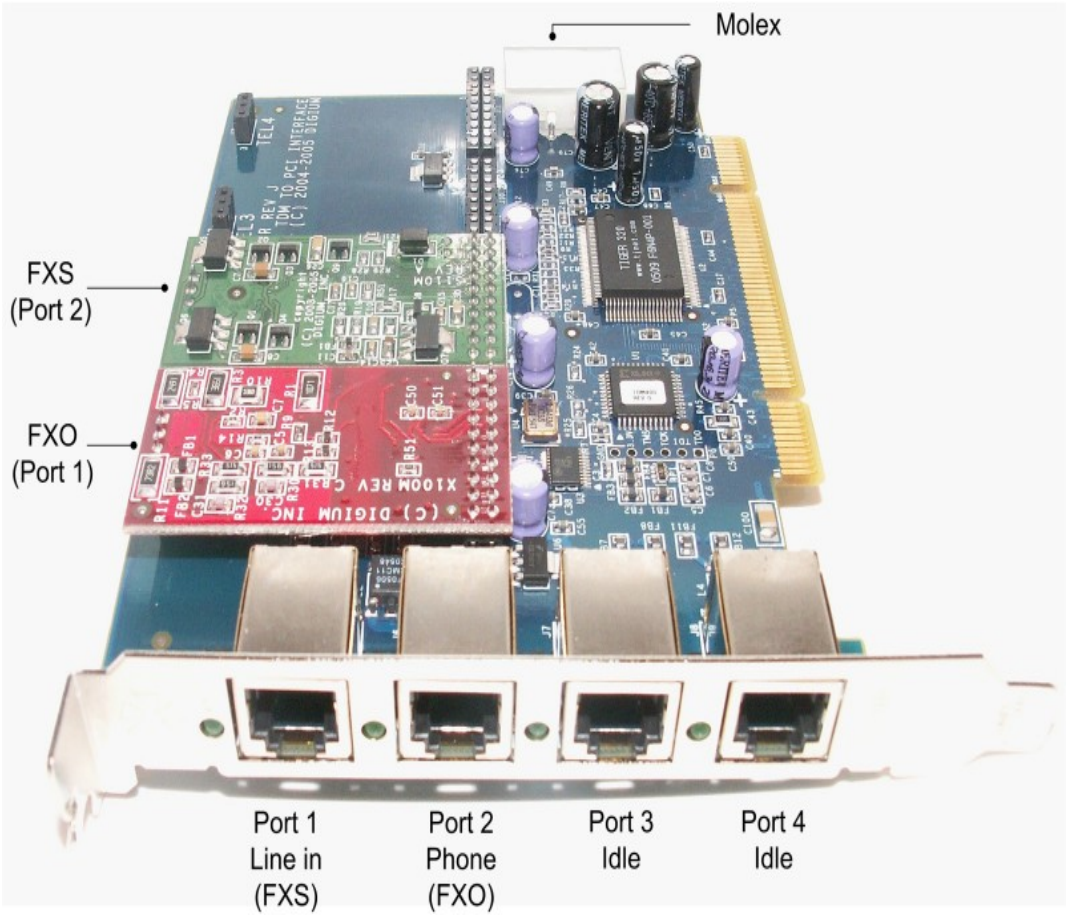
- Free and open source implementation of a **telephone exchange**
- Allows a number of attached phones to make calls to one another and to **connect to the global telephony network**
- Originally created by **Mark Spencer** (Digium)
- Best supported in **GNU/Linux**

Trying to build a low cost & low power PBX

In December 2005 (1000 USD)

- Motherboard: VIA Mini-ITX Epia M10000
- Chassi: Morex Mini-ITX Chassi Cubid 2688
- Harddrive: 40 GB IDE UDMA133
- Memory: 512 MB DDR PC3200 400MHz

PSTN interface card



What: TDM400P wildcard, 1FXO +1 FXS (Digium) ~ 190 USD

The result

What we have learned?

VoIP Challenges in developing regions

- Technical: NAT's blocks conversations
- Infrastructure:
  - Wireless (VSAT and congested)
  - Networks and not engineered for VoIP
- Power: No reliable source of power
- Regulations:
  - Ilegal service
  - Licence needed

What we have seen during this year?

- Specific VoIP distributions with Graphical Interfaces
- The use of virtualization to test and evaluate new technology
- The first asterisk-based appliances

Free Telephony Project 1

- many people working in open software
- we are working in open hardware
- professional telephony hardware designs
- that we give away
- to improve the world a little

Free Telephony Project 2

- designs can be copied modified, re-used without restriction
- we encourage cloning of our products
- trend: functionality shifting from hardware to (free) software
- trend: total system costs constantly dropping

Free Telephony Project 3

- falling hardware costs are a good thing for the developing world
- so rather than protecting IP we leverage these trends
- by giving away free hardware designs
- and encouraging cloning!

Open Hardware 1

- reference designs that anyone is free to copy, re-use, modify
- CAD files, prototypes
- differences from open software
- atoms cost more than bits
- you need a factory

Open Hardware 2

- many advantages over closed development
- similar to open software
- many eyes
- low bug count
- dramatic reduction in R&D cost and time

Open Hardware 3

- normal hardware costs include 70% overhead
- exciting new business models, e.g. OLPC
- dramatic price reductions
- local manufacture
- customisation, localisation, e.g. solar, wireless

Who are we?

- around 5 main contributors
- team has 100+ years experience in professional telephony hardware/software/DSP development
- start up/business experience
- largely self funded through consultancy to 1st world companies/product sales

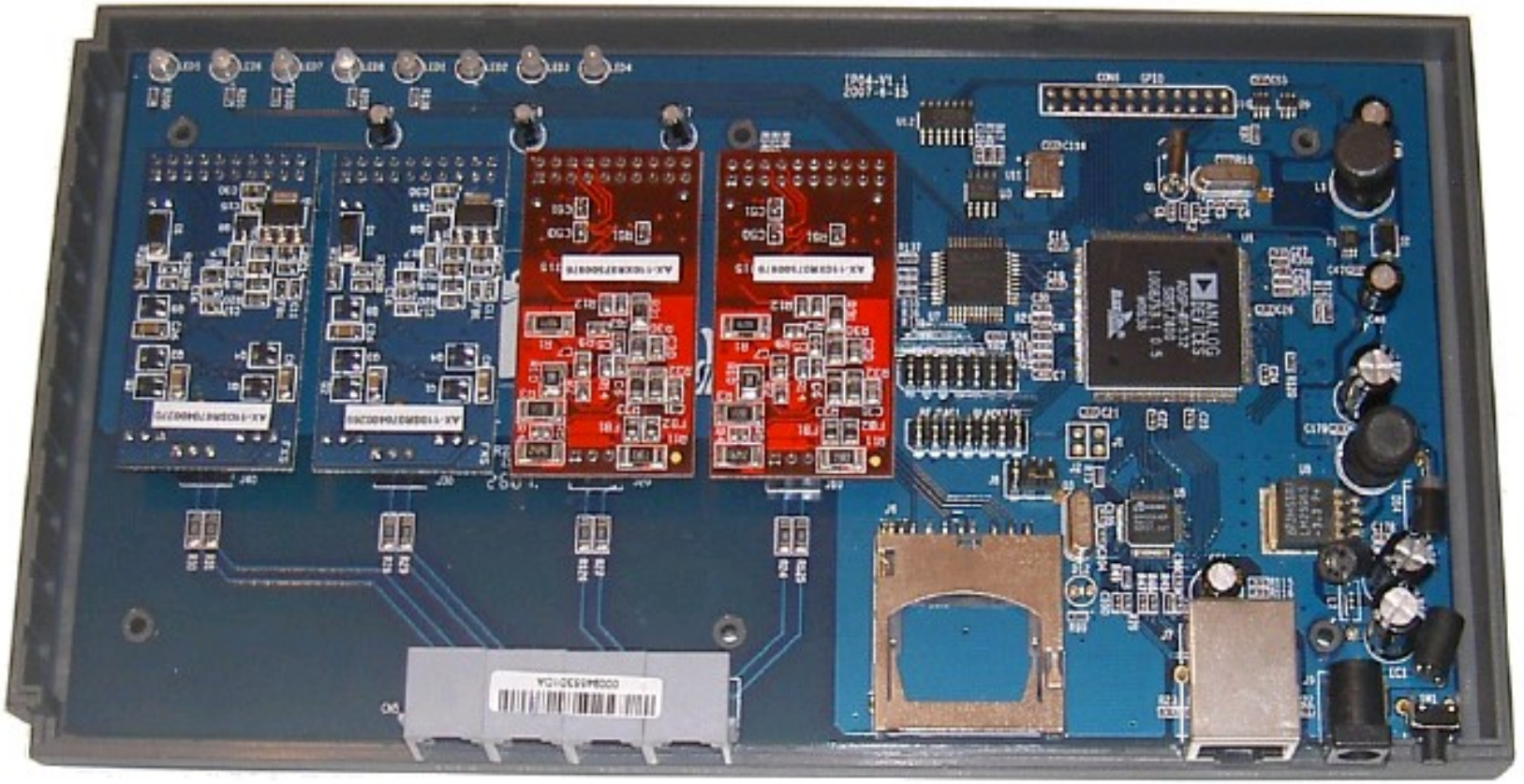
Partners

- chip vendors (Analog Devices, USA)
- hardware manufacturer (Atcom, China)
- Asterisk community
- good-will generated when commercial IP barriers are removed - people share and help each other

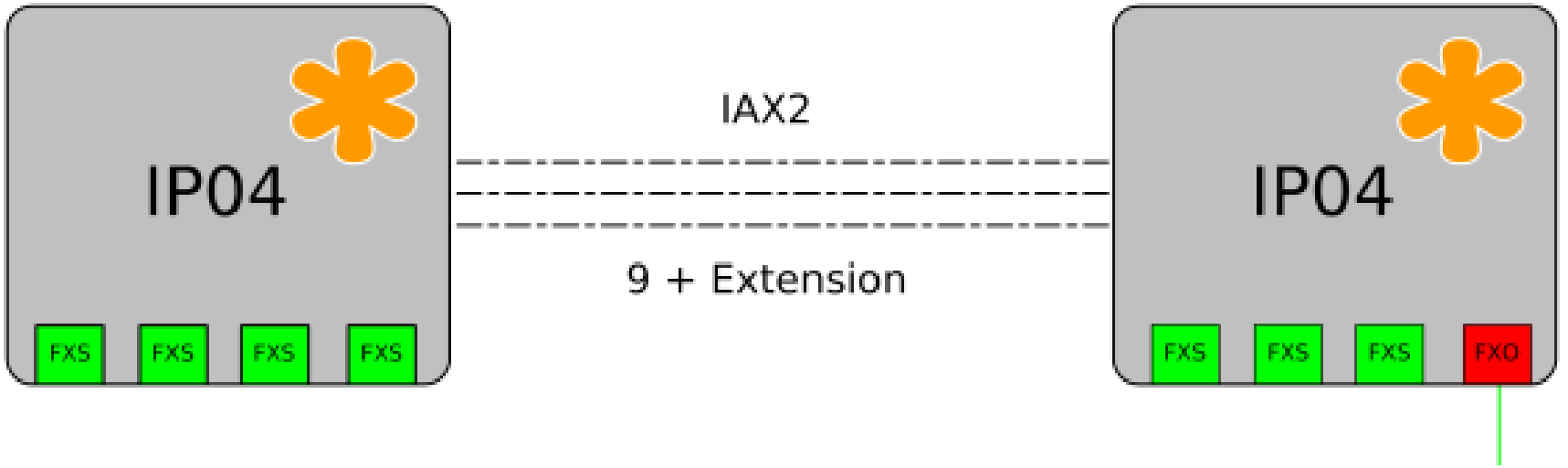
Case Study - IP04

- Switches analog and VoIP calls
- fanless, low power (5W), rugged, compact
- open hardware and software
- easy to customise, e.g. simple UI
- potential for very low cost ($100), compared to $2,000 retail for similar products

IP04 “open hardware”



Case Study – IP04



Case Study IP04

- IP04 is an “Asterisk Appliance” type product
- has reached maturity very quickly, is “leading the pack” in this class
- compared to similar products developed using “closed hardware”
- many 1st world applications/clones emerging

VoIP and GSM

- VoIP can extend GSM/PSTN network at edges, revenue for incumbent telcos.
- IP04 plus WiFi/WiMax backhauls costs are 5% of GSM deployment (base station)
- free, untimed, community owned networks
- or local business models

Concept to Production in 2 Years

- started in August 2005, first phone calls Dec 2005
- hardware/software development 2006
- IP04 prototype/production 2007
- 300 IP04s built to date, volume production in 2008

Next steps

- Beta trial, e.g. 100 IP04 VoIP network
- GSM integration
- Distribution – how can we build and distribute a $100 IP-PBX?
- End-user business model to promote viral growth

IT +46

Technology for change.

IDRC CRDI

VoIP4D