

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

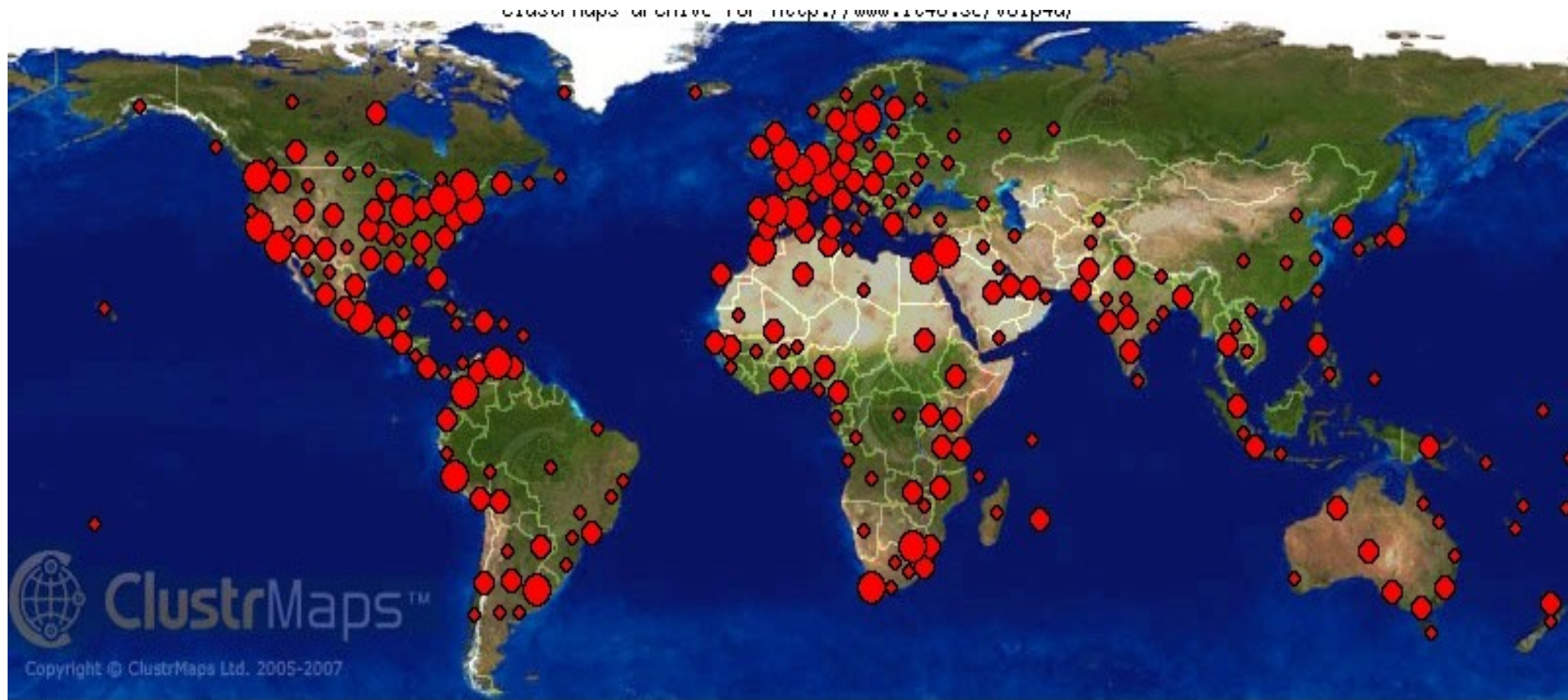
December 11 - 2006: 5700 downloads

- 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



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2007
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VoIP – 4D & Free Telephony Project

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**xchange.

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?

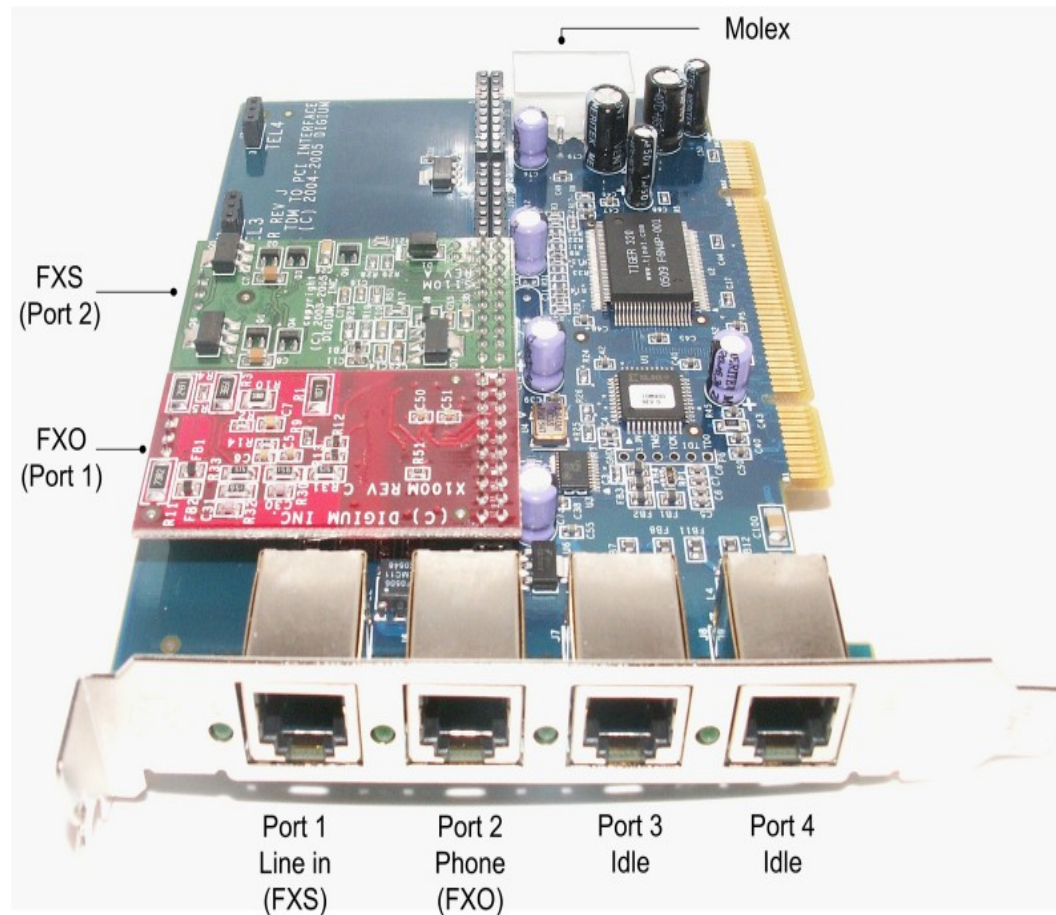
- Free and open source implementation of a **telephone exchange**
- Allows a number of attached phones to make calls to one another and to **connect to the global telephony network**
- Originally created by **Mark Spencer** (Digium)
- Best supported in **GNU/Linux**

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



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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:
 - Illegal 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

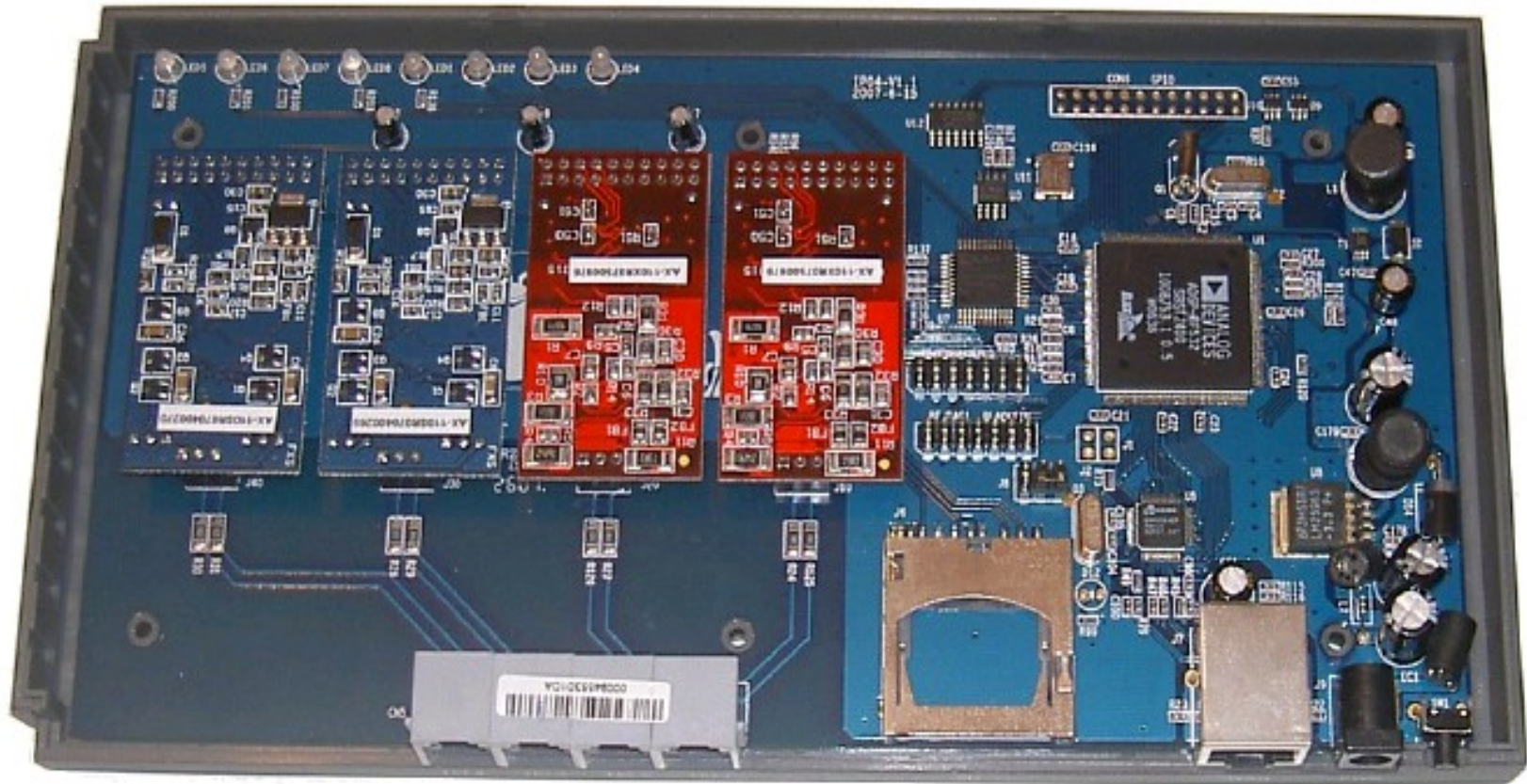
Partners

- 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
-

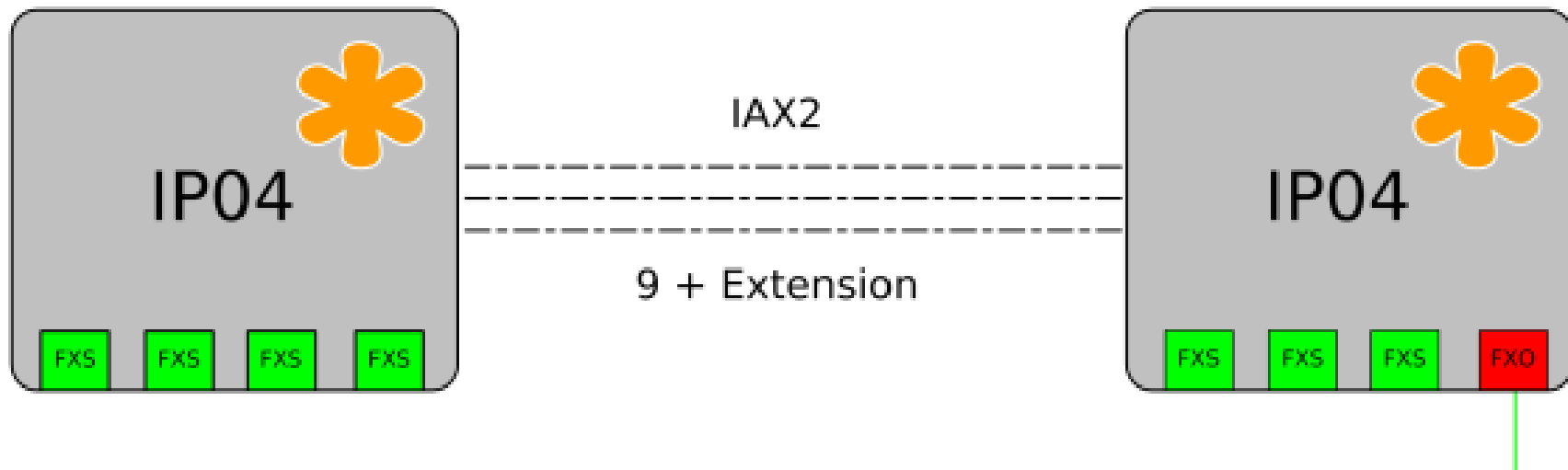
IP04 “open hardware”



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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



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Technology for change.



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