The Jhai Remote IT Project

A case study of wireless ICT in the Lao P.D.R.

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Jhai Foundation

Introduction to Jhai Foundation

Remote IT project – Jhai PC and communication system

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http://www.jhai.org

About Jhai Foundation

Jhai means 'Heart' in Lao
Based in San Francisco, USA

- **Is about reconciliation**
- **Focus on relationship**
- **Helping people help themselves**

Help/assistance on different sectors:

- **Health**
  - **-Medical supplies 20tons in 1999**
- **Education**
  - **- Internet Learning Centers**
  - **-Our most widely known work is the Remote IT Village Project**
- **Economic development**
  - **Weaving**
  - **Organic farming**

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Building good and long-lasting relationships

Co-creation of state-of-the-art solutions for people who want to keep their traditions in remote villages, and increase their income

An example: ILC & the Jhai Computer and Communications System

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Conditions in rural Laos

- No electricity, no telephone
- Low literacy rates

- 85% of economy is small farms
  - Subsistence farming is primary means of income
- Rainy season makes roads impassable

- Extreme heat and air-borne dirt in dry season

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Community context & Collaboration :

- **Jhai Foundation and Schools Online organization,**
- **The partner schools in four provinces of Laos.**
- **Collaborated -created unique facility for students/staff called Internet Learning Center (ILC).**
- **Remote IT Village project (RIT)**

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- **Jhai Foundation received funding from Schools Online and**
- **With collaborations with various ministries in Laos including**
- **Prime minister office,**
- **Ministry of foreign affairs,**
- **Ministry of education,**
- **Provincial departments of education,**
- **Lao Telecom company and etc.**

Remote IT Village Project

- **Real-world conditions, real-world solutions**

- **The Remote IT Village pilot test will link five villages in the HinHeup District, in a wireless Wide-Area Network (WAN)**

- **Uses Voice-over-I.P. telephony and Lao-language business tools to improve their standard of living while preserving traditions**

- **The network will immediately enhance business and trade opportunities**

- **Villagers will also connect by voice and email with family members who now live overseas.**

- **The system is localized for use in the local language**

- **The system is owned by the villages and is run by middle school kids literate in Lao.**

The Jhai Communications System

- No moving parts – flash memory on chip instead of disk drive
- Low power demands – LCD display
- Rugged, secure case to withstand water, dirt, and theft
- 802.11b wireless network linkage among villages
- Linkage to Internet – data and VoIP
- Open-source PABX switching to Lao Telecom system
- Human-generated and solar power
- Bicycle crank to storage battery, solar power on relay station

Localized Linux-based OS

- KDE with Lao-language tool suite

Objectives

The goals of Jhai Foundation in IT projects are as following:

- Link the adults and high school students to the world.
- Provide Internet access/facility, telephone and technology for students, teachers, staff, parents and local people in the surrounding areas.
- Help schools gain effective access to the communication and information resources of the Internet.

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- To facilitate teacher's professional development
- To provide teachers who demonstrated the desire and facility to engage their students in collaboration projects with the technology tools to enhance their teaching and their students' opportunity for learning.
- To develop sustainable and replicable models of good practice that use technology for learning and collaborations

Impact on the schools and society

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- The school's collaboration/ communication with the outside world.
- **The school will include the computer training in its curriculum**
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- The ability to exchange information with others on the Internet day-to-day and to connect with the world.
- Helping in economic development for the communities, societies, schools and education sectors

Sustainability

- The project becomes the property of the school, which they operate by themselves

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- Get monthly report from project manager.
- Each project represents a serious investment for donor and partner organizations.

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- Equipment and Internet connection carry a high cost of ownership.

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- Therefore, a sustainability plan needs to be developed by each school/village to ensure the continued effective operation of the project.

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- This plan for the project needs to show operational costs, as well as a plan for future growth.

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- Each school/village set their own policy for sustainability e.g.:
  - Membership fees or hourly fees for both student and teacher use after school hours and   holidays
  - Parent Association raises funds to cover operating costs
  - School management, teachers and students conduct fundraising activities

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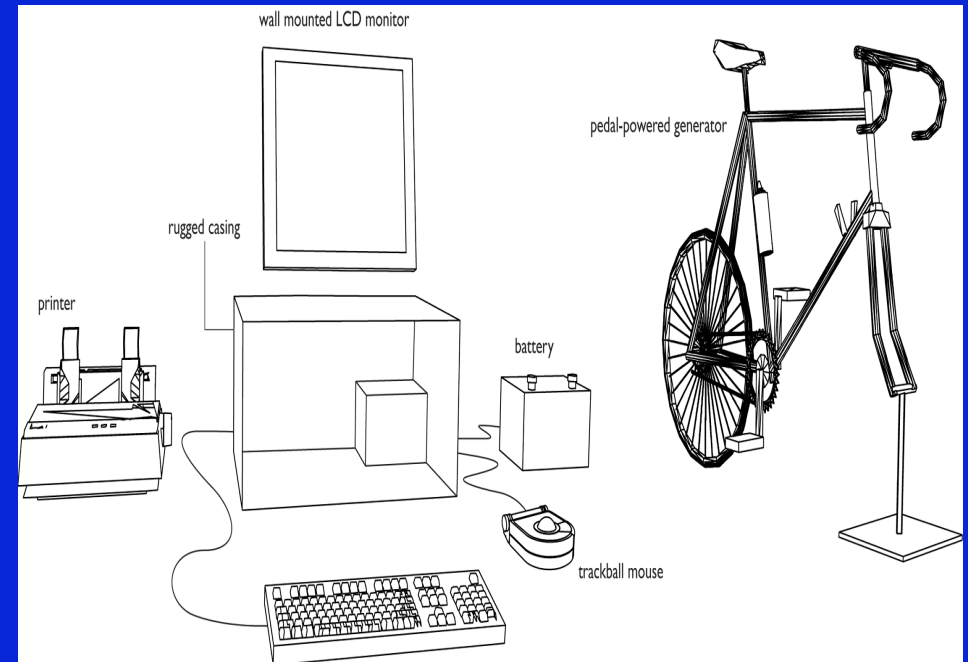
- Schools (teachers and students) can use the center to hold training/ seminars for community members and other organizations

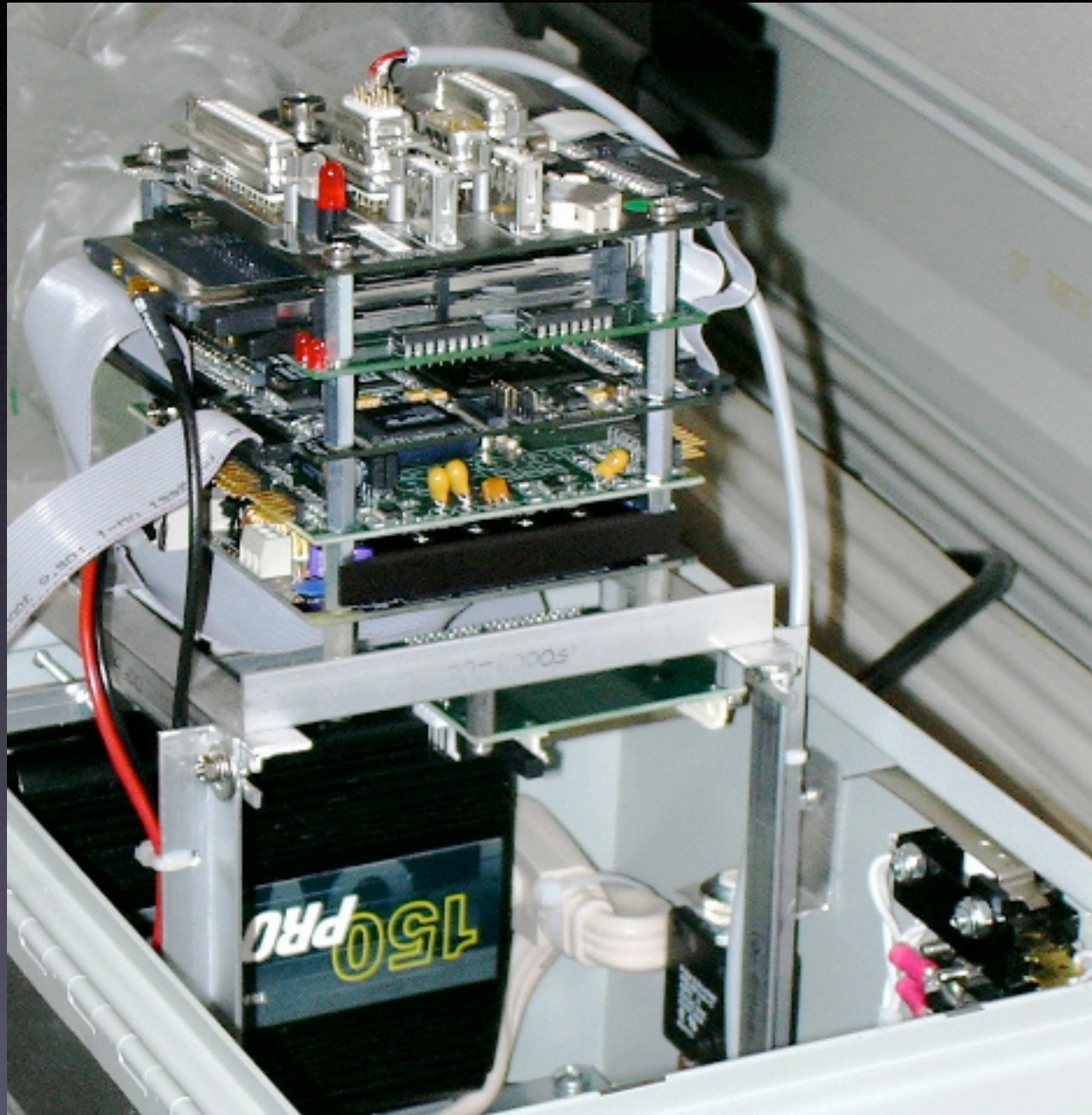- Provide service to the public, etc.

JhaiPC Technology

- JhaiPC Hardware

- JhaiPC Software

- Network

System Hardware

- Hardware

  - PC-104-based systems "stack" (P-II class CPU on Village, 486 on Server & Relay)

  - Cisco 350 802.11b PCMCIA cards

  - IBM Microdrive

  - Quicknet VOIP PCMCIA card

  - Quintum "Tenor" PSTN Gateway
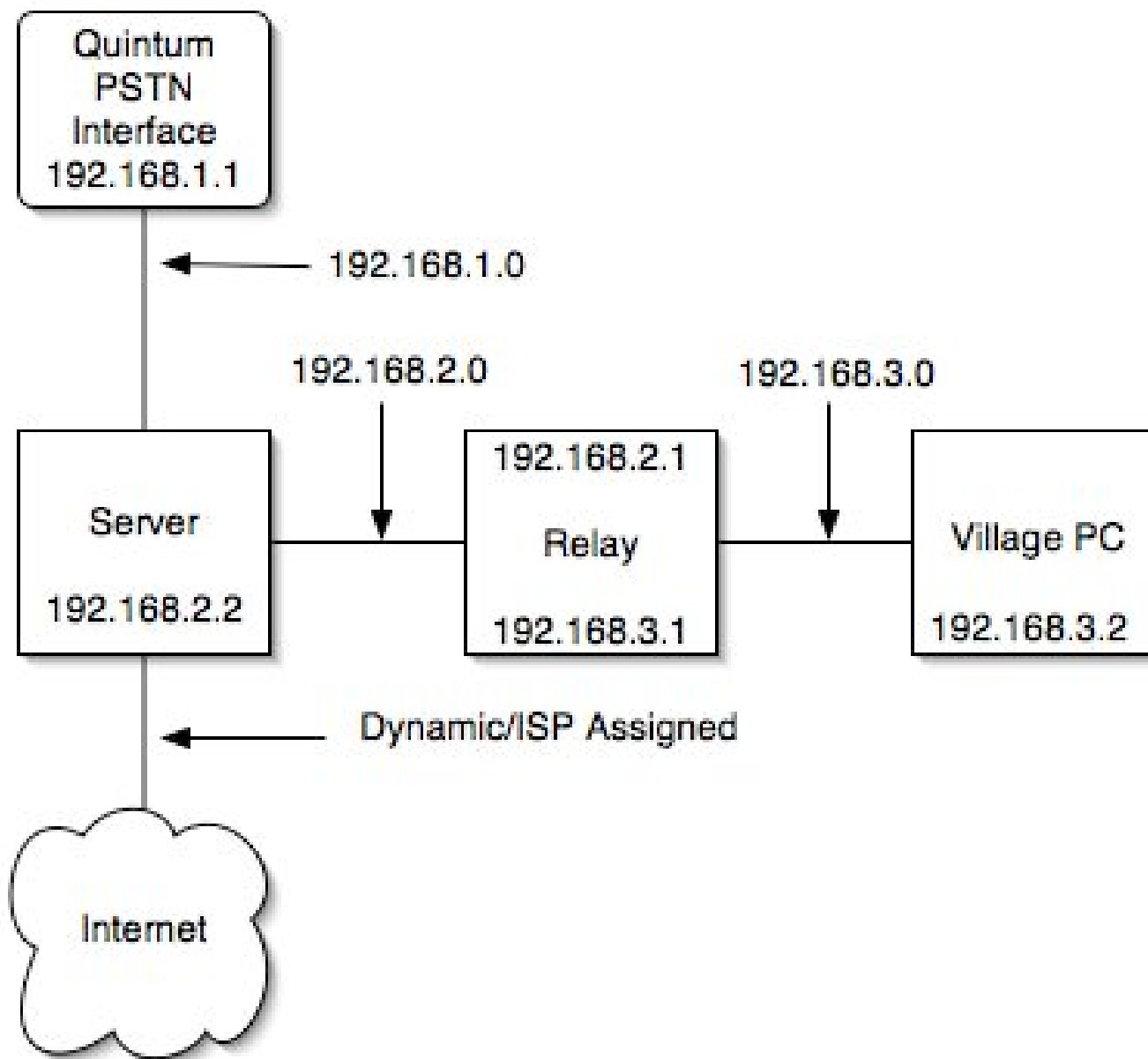
JhaiPC System Stack

Software

- System/OS
  - All Open Source Software
  - Debian Linux
    - rev. "Sid" w/ custom 2.4.20 kernel
    - Most GPL-compliant distribution
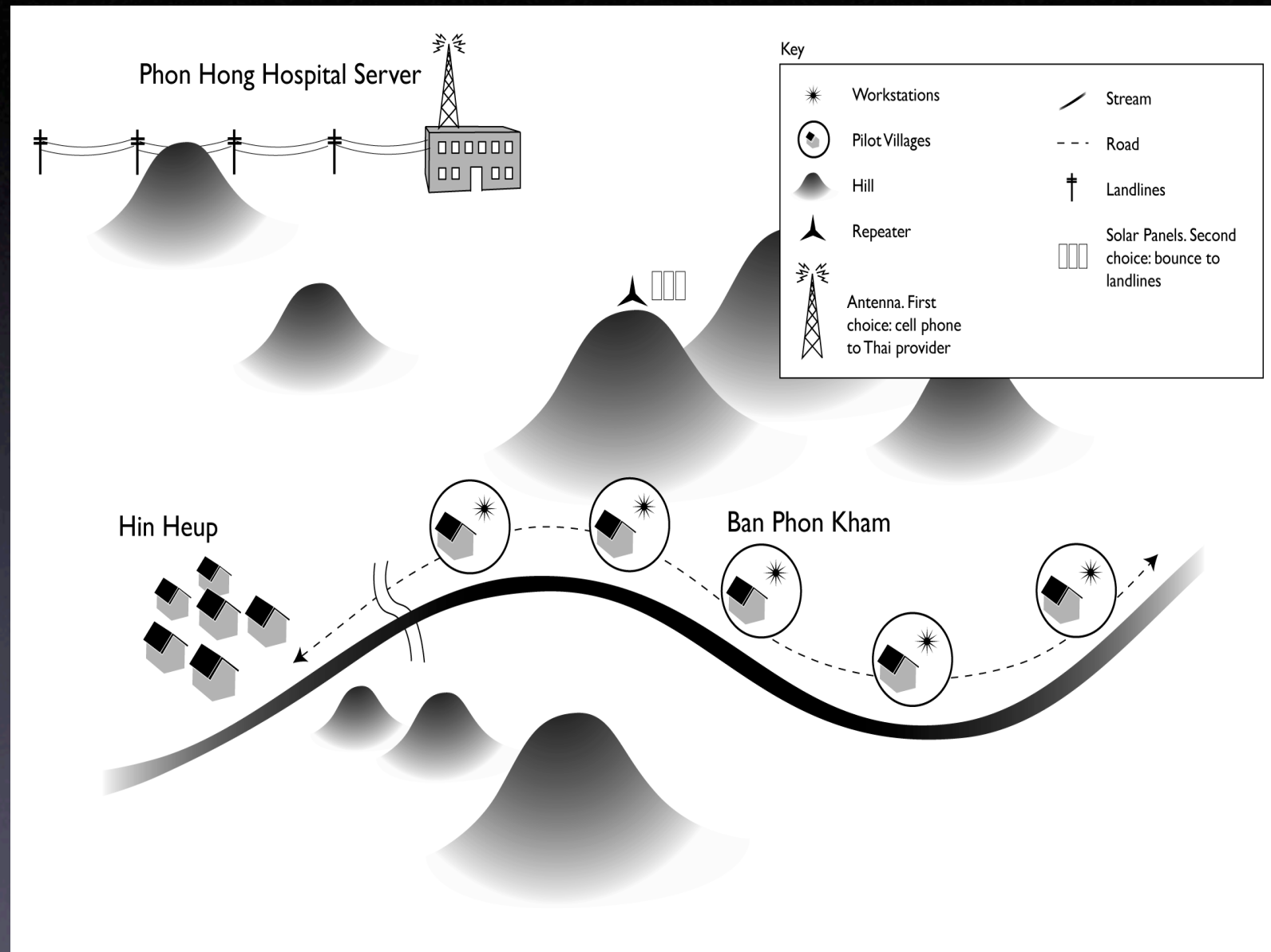   - scalable, not monolithic

Software(cont'd)

- Utilities/Drivers

  - pcmcia-cs 3.1.33 w/ patches to airo_cs driver.

  - Jean Tourrihles' wireless_tools package

  - custom monitoring/diagnostic scripts

- VOIP

  - GnuGK

  - OhPhone

Network Topology (Geographic)

Schoolhouse at Phon Kham w/ VillagePC

Treetop Relay

Water Tower at Phon Hong Hospital

Design Principles

- Commodity

- Commonality/Replicability

- Survivability

- Serendipity

Commodity

- Common, Off-The-Shelf hardware(COTS) well-known and supported under Linux

  - PC-104 system boards

  - Cisco 350 Aironet cards

  - Quicknet "PhoneCard" & Quintum "Tenor" VOIP hardware

  - IBM Microdrive

Commonality

- Identical hardware wherever possible.

- Identical base OS install on all systems

  - Same kernel/modules, even if not used

  - Role-based software layered on afterwards

- Saves time in install/recovery/repair

- Avoids the "but this one needs part X and all we have is Y" problems

Replicability

- Systems should be maintainable by trained local staff

- Parts should easily obtainable(locally or ordered in advance)

- Plan the software development process for maintainability

Change Management

- Software can change rapidly, so it frequently does change rapidly.

- Version control preserves change history

- "Trouble Ticket" tracking system organizes unplanned tasks

- Write documentation from the start

- Make backup copies of everything!

Open Source Tools

- Concurrent Versions System (CVS): www.cvshome.org

- Bugzilla: www.bugzilla.org

Survivability

- Systems need to be able to survive a number of hazards including:

  - 85C internal case temps.

  - Monsoon-level rainstorms

  - High humidity

  - Theft/Vandalism attempts

  - Animal/pest attacks.

Serendipity

- System components should accomplish multiple design objectives whenever possible

  - Examples:

    - IBM Microdrives

    - Quicknet "PhoneCard" VOIP card

    - Quintum "Tenor" VOIP Gateway

Future Directions

- OS

- Wireless

- VOIP

- Deployment

Future OS work

- OS

  - Formalize/Package-ize a "Jhai Distribution" that can be installed from CD or CF

  - Move from Microdrive to CF where it make sense

- Wireless

  - For multiple villages

    - Host-AP mode instead of bridge/relay

    - Omni antennae instead of directional

Future Wireless Work

- Wireless

- For multiple villages

  - Host-AP mode instead of bridge/relay

  - Omni antennae instead of directional

  - Look into mesh-based networks for multi-hop systems

Future VOIP work

- Quintum or Digium products to replace Quicknet LineJack PSTN card

- Asterisk vs. OpenH323.

  - Also Open Source

  - Asterisk provides SIP as well as H.323

  - Compatible w/ both Digium and Quicknet hardware

Future Deployment

- Continue cooperating with local government in Vientiane Province

- Potential re-host in other developing countries

- Deploy to 5 villages as a follow-on to 1st test deployment

- Multiple requests for similar systems in 90+ countries.

Links

- Jhai Foundation: www.jhai.org

- LaoNux: laonux.muanglao.com

- OpenH323: www.openh323.org

- GnuGK: www.gnugk.org

- Debian Linux: www.debian.org

- QuickNet: www.quicknet.com

- Quintum: www.quintum.com

- Tri-M Systems: www.tri-m.com

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