Dr. Onno Purbo's Sabbatical Year @IDRC

IDRC CRDI

Canada

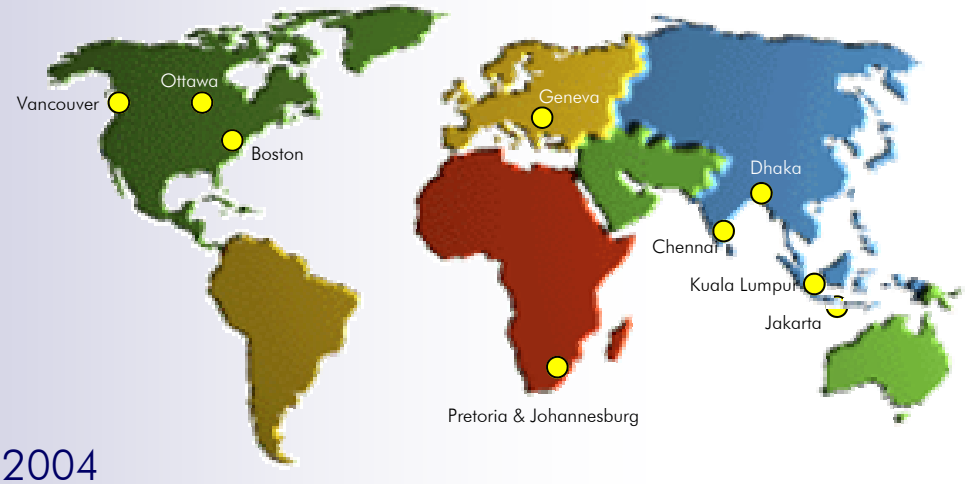
ICT4Poverty Reduction - Harvard

"Dr. Onno Purbo is a self-confessed tech rebel. He was educated in Canada but returned to Jakarta to set up a technology movement whose innovative technologies prey on the margins of legality. His open-source philosophy is designed to equip Indonesian kids with the skills to participate in the knowledge economy. Thanks to this country's International Development Research Centre, where Dr. Purbo is taking a sabbatical, Canada has a direct link to four million Indonesians."

- Ken Wiwa,
Globe and Mail

Dr. Onno Purbo's one-year sabbatical with IDRC has included dissemination and training at conferences and workshops in Laos, Geneva, Boston, Malaysia, Jakarta, Canada, India, Bangladesh, and South Africa. His interaction with ICT regulators, activists, policy makers, academics, and "techies" from countries around the globe has brought them insights, knowledge and hands-on experience about low-cost community infrastructure solutions such as WiFi (Wireless Fidelity) and VoIP (Voice over Internet Protocol).

Where in the World is Onno?



2003-2004

ICT4Poverty Reduction at Harvard University

In September 2003, 30 experts from around the world gathered at Harvard University to discuss how information and communication technologies (ICTs) can help to reduce poverty. Please see http://web.idrc.ca/en/ev-46261-201-1-DO_TOPIC.html. In discussing "Barriers to ICT diffusion to Poor People", Onno noted:

> *"The barrier [is] actually not the tool. The barrier would be the education process. To educate the society to share the knowledge within the society, to encourage the society to produce their knowledge in local languages. That's a major barrier. So, it's not the tool, it's not the money, it's not the funding, actually the education process would be the barrier. Of course, the government also creates some sort of barrier in the public regulation. We need to liberalize the regulation to enable community broadcasting as well as low cost Internet access"*

Alison Gillwald
University of Witwatersrand
South Africa

Clotilde Fonseca
Fundación Omar Dengo
Costa Rica

Michael Spence
Stanford University, Nobel Prize Economics 2001
United States

M.S. Swaminathan
Swaminathan Research Foundation, India

WSIS & CERN (Birthplace of the WWW)

In December 2003, Onno played a very active role at the WSIS (World Summit on the Information Society), giving a total of 5 presentations on community-based ICT development. He also presented in the session "Return to Society" in RSIS (Role of Science in the Information Society) hosted by CERN. Onno published an article in the *Courier*, CERN's international journal (http://www.cerncourier.com/main/article/43/6/20) titled "Internet for the Masses".

Other activities for Onno at WSIS included the IDRC workshop entitled "Democratizing Access: Community-Driven Sustainable Solutions" and demonstrations at the ICT4D Platform in the Canadian Pavilion. He was featured in STORIES FROM THE FIELD @ Canada's Pavilion, in GLOCOM: Cultural and Social Impact of Mobile Technologies, and in UNDP's Institute@WSIS: Emerging technologies & Innovative solutions.

Publishing Onno

To increase Onno's reach and encourage more people to experiment with alternative technologies, Onno has produced technical "how-to recipe" books on WiFi and VoIP. A dedicated team supported by IDRC worked very hard on both the technical and language components of the books, which are now fully edited. These manuscripts are currently with co-publishers. We hope that these printed materials will extend the coverage of Onno's knowledge network.

IDRC and Bellanet have provided the facility to host the softcopy of Onno's books at http://sandbox.bellanet.org/~onno/, enabling any Internet user in the world to download and benefit from the knowledge. Those who download the contents and save them on CD-ROM, are free distribute it. Widespread distribution and interest have led to a wifi4d online discussion group with over 100 members exchanging information about using alternative technologies in their own context.

Excerpt from Chapter 1 of Onno's Books

… In this book, I am suggesting a recipe for an alternative path for ICT infrastructure deployment. This path, which is flourishing in Indonesia, involves a largely self-financed, bottom-up, community-based ICT infrastructure. Were the government to address the single most pressing issue today in ICTs — increasing citizens' access to ICTs — it could be achieved through liberalizing telecommunications so that innovators are rewarded for their use of new technologies. This, coupled with a community-driven approach, would ensure a sustainable and demand-drive information society.

We live in an era where advances in ICT technology lead to much lower costs and more user-friendly equipment. A bottom-up, community-based ICT infrastructure is not impossible to achieve. On the content side, incentives for local knowledge production could create indigenous and relevant content to provide information and knowledge that is required for wealth creation and poverty alleviation.

I strongly believe that a carefully crafted plan that mixes a hybrid of top-down government and private investor regulations, policies, and incentives, together with a community-based bottom-up approach ICT infrastructure would best suit any developing country seeking more broadly based access for its citizenry. The balance will emerge from the demand and response of the people to ICT access and services.

Because I know it well, I will stress the community-based bottom-up approach. However, to be effective, government must play a central role and create an enabling environment in which to further achieve our dreams. If we want to achieve a common vision of a knowledge-based society that can engage effectively in the global economy, it is critical that we develop an inclusive national policy process. This process must identify national objectives, targets, and milestones so that the goal can be realistically achieved …

A Glimpse at an Outdoor WiFi (Wireless Fidelity) Infrastructure

Wireless Fidelity (WiFi) is based on Wireless LAN (WLAN) equipment. It is basically Internet over radio using off-the-shelf, user-friendly, and relatively low-cost Wireless LAN equipment. The primary purpose of WiFi is to bypass a Telco's last mile by 5-8 km.

WiFi equipment reaffirms the standard IEEE 802.11b or other standards such as, IEEE 802.11a. The set up of a WiFi network involves placing an external antenna at the end of a WiFi card. This configuration may reach up to 5-8 km distances (often enough to cover most medium size cities in developing countries). The IEEE 802.11b WLAN equipment normally uses 2.4GHz band & runs at 11Mbps. Thus, it achieves a significantly higher speed compared to traditional dial-up.

The WLAN card is normally installed at the router of an Office Network, InterNet Café or Neighbourhood Network. A Linux-based PC is often used as the router (or gateway) enabling it to serve a proxy function as well as an Internet telephony gatekeeper (phone softswitch). Neighbourhood Networks and InterNet cafés would be a natural choice to reduce access costs. A Neighbourhood Network is essentially a LAN connection to the neighbours achieved by running LAN cables to them. Unfortunately, distance is a major drawback for WLAN (WiFi) technology. Thus, merging WiFi technology with fibre optics or satellite providers becomes a strategic solution for community ICT infrastructure.

How does outdoor WiFi infrastructure facilitate ICT for Development?

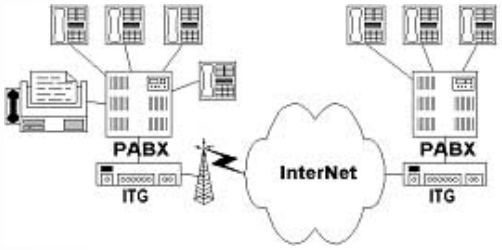
Onno demonstrates the creation of a "Pringles can" WiFi antenna in South Africa

From a cost point of few, ready to use client-side WiFi equipment would cost about US$150-200. A US$50-100 external antenna may be added to extend the range. Since it is very easy to make the antenna, it encourages home industries to produce such antennae and sell them at US$15-20 each. The typical total cost will range from US$250-300. Those who like to build their your own PC-based client WiFi equipment may get achieve the desired configuration with a significantly reduced investment. Please see the picture on the left illustrating the creation of an antenna from a Pringles can.

The WiFi investment can be shared between 10-20 computers in the neighbourhood. It is safe to say that the WiFi-based infrastructure investment cost would be around US$25-30 per neighbour. In Indonesia, the operating cost is normally about US$15-45/house for 24-hour access. To provide some context to these numbers, a typical cellular investment/subscriber is about US$300-400/subscriber. While, a typical fixed wire telephony network/public switch telephone network requires about US$1000/subscriber. Thus, WiFi-based infrastructure requires a considerably lower investment cost per subscriber compared to the traditional Telco.

A Glimpse On Internet Telephony (VoIP) Infrastructure

From the discussion about WiFi-based outdoor infrastructure on the previous page, we see that one can have 24-hour Internet access at a cost of US$15-45/month/house. The total investment price tag of US$250-300 per WiFi gateway, or about US$15-45 per neighbour, is the driving force behind the deployment of community neighbourhood networks.

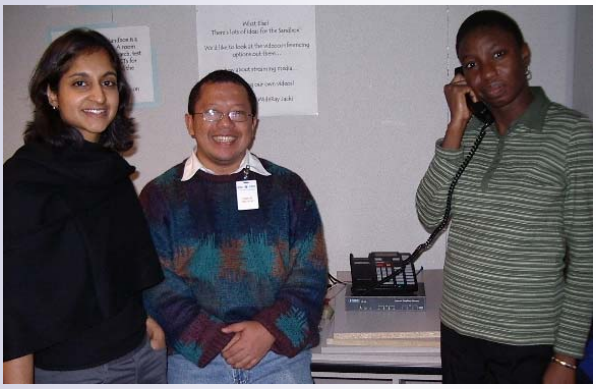


Having 24-hour Internet access, the next logical step would be Internet telephony. Voice communication is still a dominant mode of communication in developing countries. We normally use an Internet Telephony Gateway (ITG) connected to a small PBX to share the telephony with an office or a neighbour.

How does Internet Telephony help ICT for Development?

Let's review the cost - a typical Internet Telephony Gateway (ITG) with four (4) ports would cost about US$400 each. The ITG will translate conventional voice traffic into VoIP traffic over Internet infrastructure.

To reduce the investment and operating costs, conventionally we connect the ITG to a Private Branch Exchange (PBX) and share the VoIP lines with more people in the office or neighbourhood. Thus, it is normal to connect all four (4) ITG's port to PBX. A typical PBX, such as, Panasonic KX-TA616 has 6 CO lines and 16 extensions. A Panasonic KX-TA616 may cost approximately US$400-500.



Onno sets up VoIP in IDRC's Sandbox to call the Dakar regional office

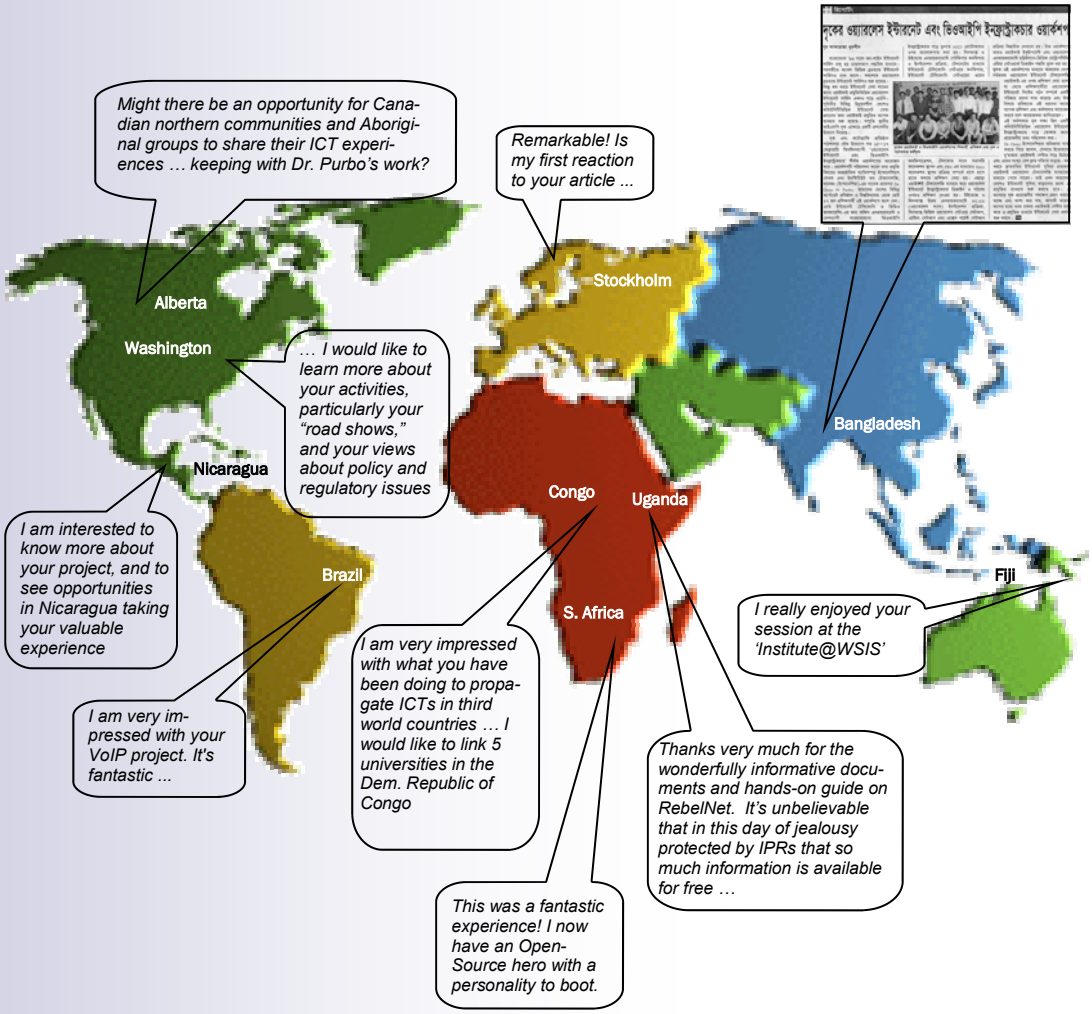
Therefore, the investment cost would range from US$800-900/16 extensions, or US$50-60/extension. We can now reduce this cost by using low-cost equipment.

The US$15-45/month/neighbor cost discussed above for the outdoor WiFi infrastructure can now include an "unlimited" long distance calls over the Internet to other community-based networks.

Going Global: Onno's Enthusiasm is Contagious!

The nature of email and the Internet promotes the multiplier effect for Onno's work. The impact of his teachings is not limited to the numerous workshops and presentations he delivers. Onno's contagious enthusiasm, commendable commitment to email correspondence, and facilitation of the active wifi4d mailing list have enabled his message to proliferate at a feverish pace around the globe.

Below are only a few examples of the overwhelming reception and feedback to Onno's work and personality in the last year alone.



Onno-mania!

Spreading the knowledge …

Onno @ WSIS Workshop

"Carted" away for his rebel teachings …

Having fun!!!

Cloning Onno …

At the Pan Asia Networking Conference in Laos (March 2003), we received countless suggestions to "clone" Onno in order to multiply his ability to educate people about his experiences and vast expertise on VoIP and WiFi technologies. Onno's sabbatical year with IDRC did just that!

Thank You!