

Low Cost Networking

Can it provide a solution to wider ICT network access in developing countries?

TNO | Knowledge for business



Content of presentation

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TNO is active in five core areas



TNO
Quality of Life



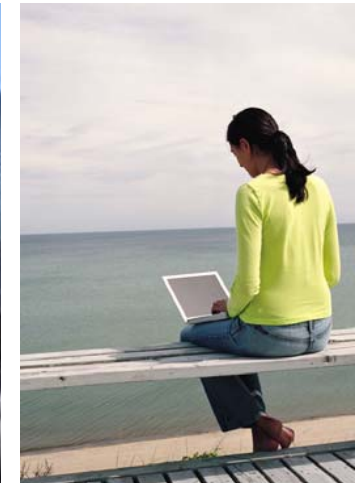
TNO
Defence,
Security
and Safety



TNO
Science and
Industry



TNO
Natural and
Built
Environment



TNO
Information and
Communication
Technology

Facts & Figures:

- TNO mission: apply research for companies and governments
- 5000 employees, annual turnover: 562 Mio euro
- Not for profit
- Located in the Netherlands

TNO ICT

Our mission statement: Innovation with ICT

About us

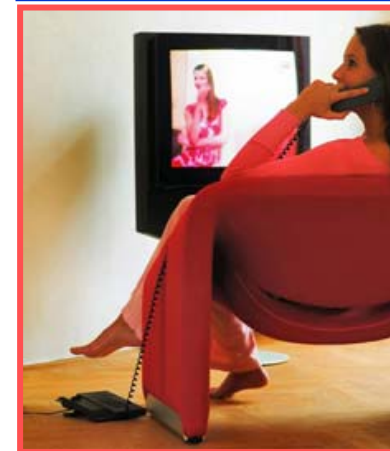
- Established: 1 January 2003
- Bundling of former KPN Research with TNO's ICT related departments
- One of the largest ICT knowledge centers in Europe

Features and unique selling points

- Independent
- Frontrunner
- Multidisciplinary:
 - Conceptual and hands-on
 - technical, economical and sociological
 - In-depth Telecom and IT expertise

Key figures

- Annual turnover: EUR 40 Mio
- 375 professionals
- 10 high-quality patents per year
- Locations in Delft, Enschede and Groningen



Introduction

- Close the digital divide
- Support the millennium development goals
- Our presentation doesn't focus on the mobile web, but on infrastructure, lessons learned and applications. We believe a lot of this applies to the mobile world as well.
- We need to scale up
 - technology
 - education
 - organisation
 - legislation
- Low Cost Networking could help

Low Cost Networking, the concept

- Combine available ICT resources to work together as one virtual network
- Each resource can be owned by different parties as long as certain standards are adopted.
- Each addition in the infrastructure strengthens the network
- Perceived as seamless networks to the end-users, and maintaining security

Example of successful ICT innovation

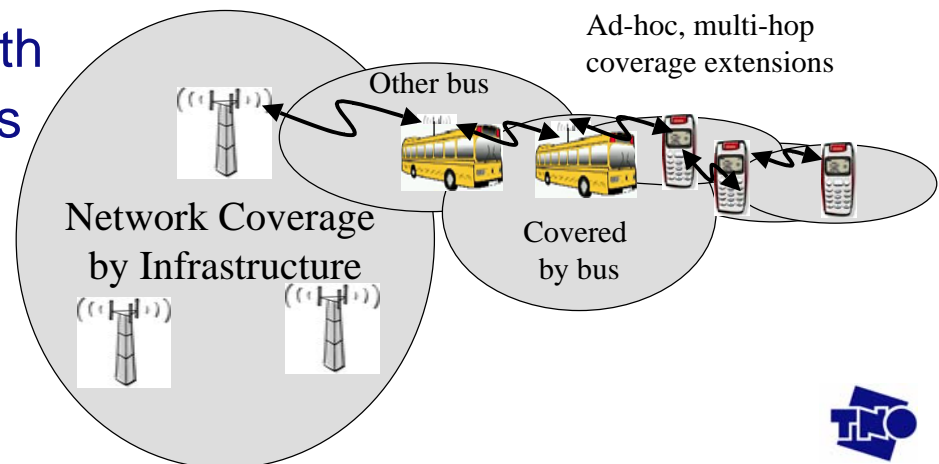
- Grameen phone ladies in Bangladesh
- Branch of Grameen bank (2006 Nobel prize)
- 2,200 telephone ladies employed by Grameen Telecom, aiming for 40,000
- These women are earning an average income of \$1000 per year, the average annual income is ~ \$300



Low cost networking

Technology and business

- Ambient Networks program, EU IST project
- Affordable Wireless Services & Infrastructure, Swedish project
 - Reduce main costs of infrastructure and maintenance
 - Ad hoc and heterogeneous networking
 - Composition:
to act as one seamless network to the end user
- Apply this technology to situation of developing countries
- Decentralised and gradual growth
 - more but smaller investments
 - microcredit businesses?



LinkNet

- Goal: to connect rural Zambia to internet
 - robust and at minimal cost
 - operations and maintenance by local people
- LinkNet connected Macha to internet
 - in 18 month from isolated village to a 100 internet connections
 - turn-key container solution
 - Centre of Expertise and Masterplan for scaling up to all of rural Zambia



LinkNet



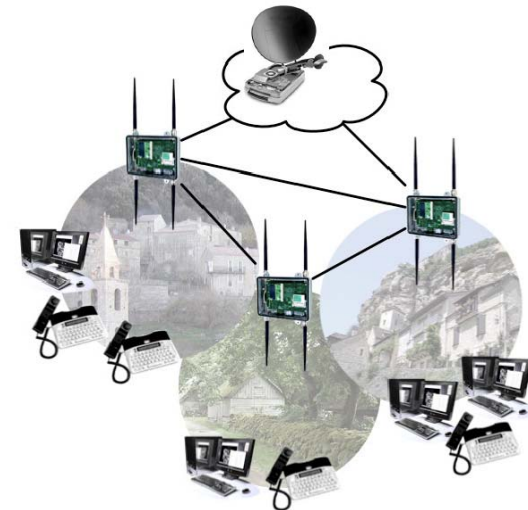
- Turn-key sea container solution
 - packed with pre-installed technology
 - Very Small Aperture Terminal (VSAT) connection
 - Mesh WLAN implementation with modified Linksys wireless routers (OpenWRT) for local connectivity, Ubuntu Linux back-end
- Elements of success for LinkNet:
 1. Holistic approach involving health institutions, schools and community members;
 2. Training of local people for rolling out the network, daily operations and onsite support;
 3. Packaging the technology in the LinkNet Resource Container;
 4. Central training and implementation at the LinkNet Centre of Experience at Macha;
 5. Self-sustainable: local community covers all operational costs, after initial donation by western people.

Challenges with deployment in rural Africa

- Africans are just as smart people as we are; they just don't have access to information and education the way we do. Taking the time required to train locals is *critical* to ensure durable implementations of technology
- Southern Africa is more about relation than about ration: huge cultural gap with the west. Ownership should be managed carefully.
- No backbones
- Most computers in ruralAfrica are donated from the west
 - usually full of viruses
 - broken components due to transport, low on memory
- Rural areas in development countries are resource limited. This certainly applies to bandwidth. Standardisation bodies should keep this in mind: broadband is not common for the African continent.
- The price per bit in communication is declining all over the world, except in Africa. This can only be overcome by fiber backbones and new technology like WiMax.

CommCase

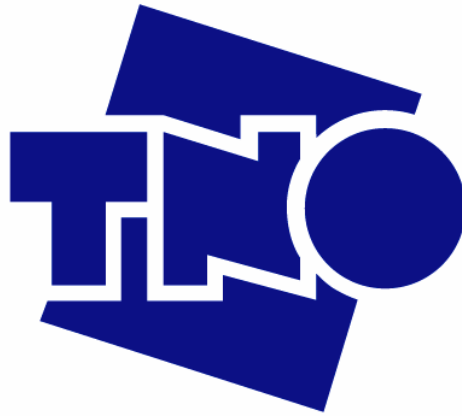
- FOKUS (Fraunhofer Institute for Open Communication Systems)
- CommCase provides:
 - boxes equipped with sensors and antennas
 - that form ad hoc networks
 - communicate between themselves and other nodes
- Characteristics
 - autonomous setup,
 - low power usage
 - operate under extreme conditions
 - operate mains-independent (solar power)
- Idea: extend container of LinkNet with CommCase boxes
- Be aware that the CommCases should not be a black box for local people



Proposal

- Combine the key success factors of LinkNet with the business model of Grameen phone and the technology of ad hoc or heterogeneous networking, the concepts of CommCase and the LinkNet container
- Collect other best practises, also from *your* experience
- Support ICT initiatives in scaling up (hands-on experience) from local to country-wide rollout
- Make a multi-disciplinary plan to provide complete countries with internet access including:
 - needs assessment
 - technology development
 - necessary legislation
 - development of skills
 - sustainable maintenance organisations
 - business cases
 - cultural aspects





The innovative partner for industry and government
in developing and applying ICT knowledge and skills

TNO Information and Communication Technology

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