

Community Wireless Networks: Low cost broadband access and infrastructure

The CWRC Experience

Presented by

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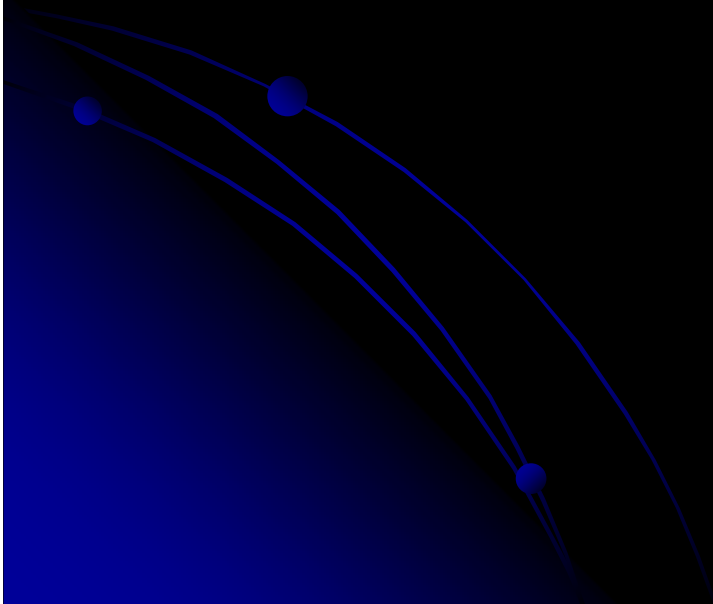
Web: <http://cwrc.it46.se>

Introduction

- Uganda's communication development priority is to have 'affordable communication services for all'
- The Community Wireless Resource Centre (CWRC) established under the Department of Electrical Engineering seeks to:
 - Implement and support maintenance of community (i.e. cooperative-type) wireless networks
 - Build capacity in design, installation and maintenance of community wireless networks
 - Undertake research in area of community wireless networks
 - Document and share results widely
- CWRC was established in 2006 with financial support (US\$ 89,866) from IDRC as well as technical support from Swedish-based IT+46

Objective

- Provide or enhance sustainable Internet connectivity infrastructure, particularly in rural or under served areas in Uganda, by means of wireless technology.



Rationale

- Affordable and equitable access to information remains challenge, particularly in rural areas
- Communications and energy infrastructure, illiteracy, ICT skills, etc
- Various initiatives seek to support Internet access up to district level
- National Backbone Initiative, Rural Communications Development Fund, Rural Electrification Programme (also has ICT component)
- Need for 'last mile' solutions to link to parish/village level e.g., from district headquarters to village information kiosk



CWRC roles

- Implements and supports community wireless networks
- Train students and technical staff so as to build capacity in design, installation and maintenance of wireless networks,
- Undertake research in the area of community wireless networks and document and share results widely.

The CWRC Experience

To-date, four telecentres have been supported:

Lira CPAR telecentre in Northern Uganda

Kabale and Kachwekano telecentres in South West

Nabweru telecentre in Central Uganda

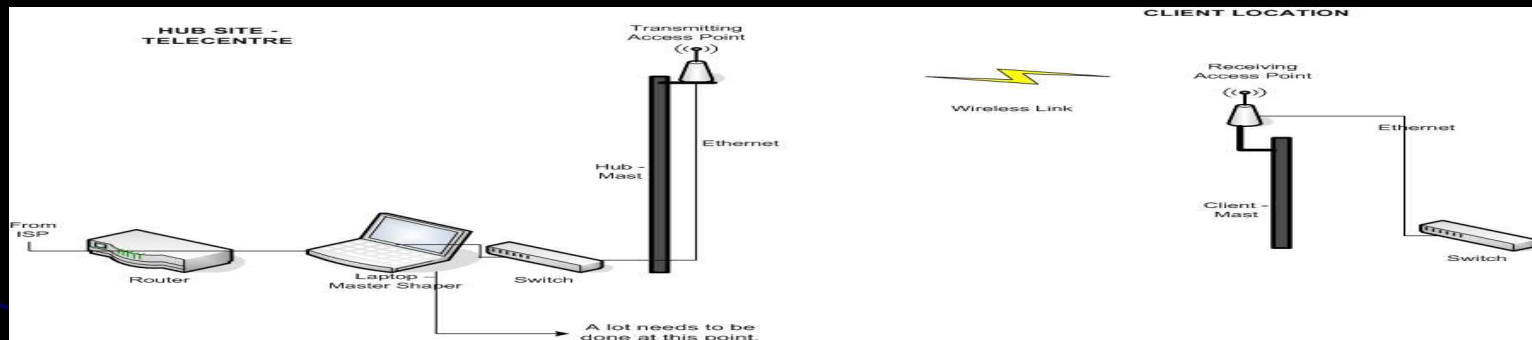
Sixteen partners: Kabale (9), Lira (3) and Nabweru (4)

- Flat terrain in Lira and Nabweru, while very hilly in Kabale
- Generally low incomes at all four sites
- Most partners at Kachwekano off the grid and depend on solar power



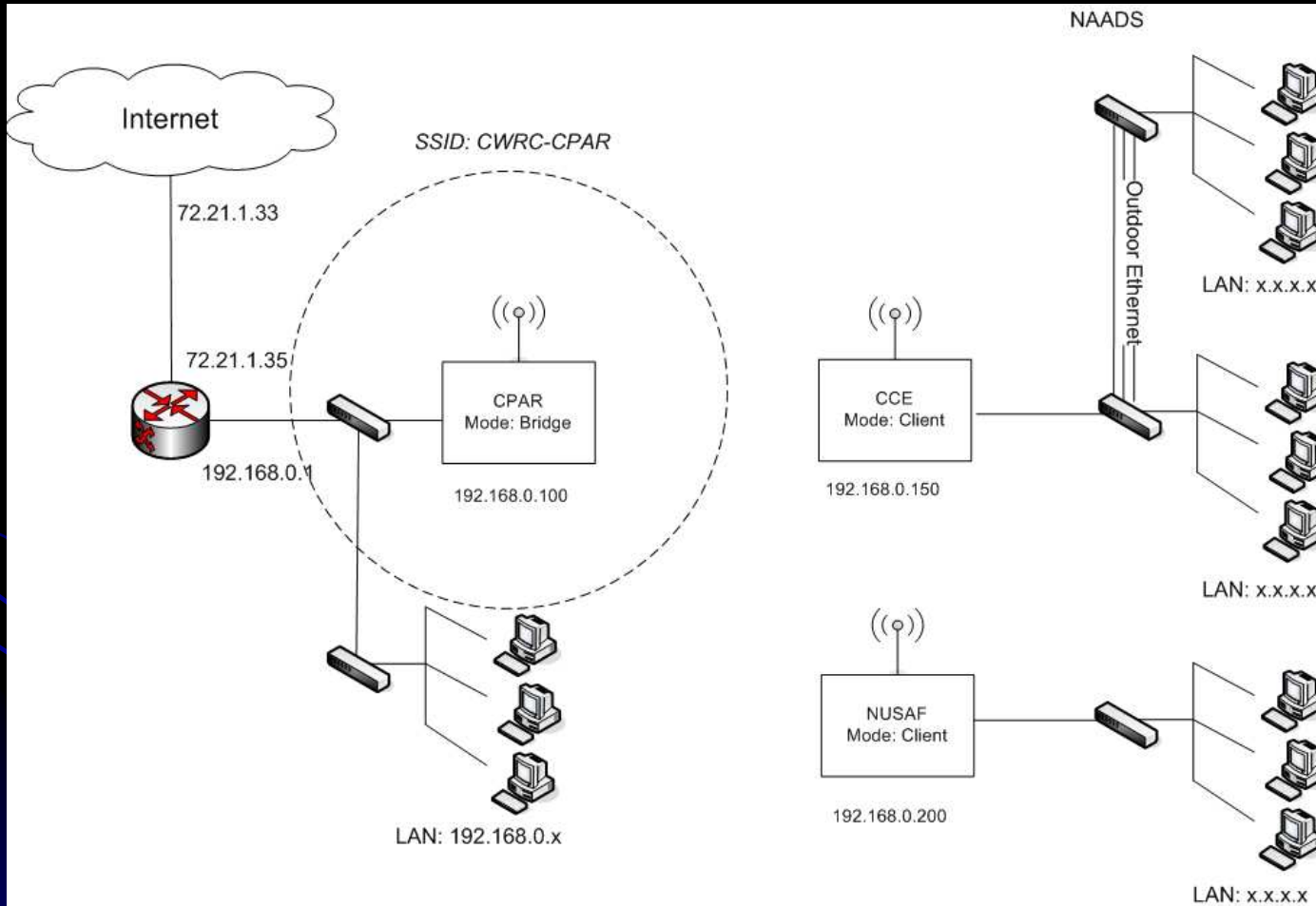
The CWRC experience

- Networks set up in star topology with telecentre as the hub
- Networks operate in 2.4 GHz Wi-Fi band with both indoor and outdoor radio units. Wi-Fi is unlicensed in Uganda



- Telecentre managers maintain the network with technical support from the CWRC
- Partners/clients contribute to Internet costs on an equal basis, e.g, in Kabale and Lira, service is 3GB/175Kbps at about 81\$ per month
- Nabweru currently not fully operational due to large outstanding Internet bills

Example: the Lira Network



Challenges

1. Lack of sensitization on the ways of managing bandwidth to reduce the cost. More bandwidth than is anticipated is consumed.
2. Equipment breakdown due to harsh environmental conditions i.e Lightning
3. Clients do not agree on the fees breakdown
4. Sustainability of the telecentres. Payment of people to maintain the
5. High turnover of project staff

challenges through research initiatives

- The Wireless Africa (WA). WA aims at implementing low cost, affordable technologies and applications that result in the high use, potential revenue and/or dramatic cost-savings. This initiative will result into the implementation of appropriate business models for sustainability of telecentres.
- The MP/ Scientists pairing scheme managed by the Uganda National Academy of Sciences (UNAS) attempts to expose policy makers to current technology trends and also enabling scientists to appreciate policy and the law-making process. This has a tremendous impact in enabling research groups like the CWRC to influence policy. For instance, this could create an enabling environment to make ICT equipment more locally available.
- Capacity building in the Department of Electrical Engineering through industrial training. These students are equipped with skills in wireless networking.

Solving the challenges through research initiatives(contd)

- The CWRC will address a number of bandwidth-related challenges for community wireless networks through a grant from the Millennium Science Initiative (MSI) project, managed by the Uganda National Council of Science and technology (UNCST). The MSI project will involve supervision, mentoring and training of sixteen (16) students and will address questions like;
- Traffic shaping in a “static” – as opposed to an adaptive wireless environment so as to ensure latency and congestion management as well as fairness within the network
- In the case of adaptive bandwidth schemes, what key factors should be actively monitored in order to determine and quantify the “extra” bandwidth utilized by a user?
- Impact of the propagation environment on the viability of adaptive bandwidth management
- Cognitive radio
- What policy recommendations can be provided to improve the capacity of wireless technologies in the provision of diversified services and value addition – even in the presence of licensed users?

Future trends

- Organization of training workshops, both theoretical and practical in the telecentres.
- Telecentre managers are responsible for the maintenance and troubleshooting of any network issues that may arise from the community wireless networks. CWRC intervenes when they fail

Future trends

- Establishment of a technical team comprised of staff and students in the department of Electrical Engineering, telecentre managers and technical personnel at telecentres.
 - (i) arriving at sustainable solutions for the Telecentres
 - (ii) enhancing capacity building in the Department of Electrical engineering.
- Discussion of technical issues arrived at, in order to share lessons learned using mailing lists
- Research and technical support for the telecentres.addressing issues
 - Bandwidth management, which is currently a key challenge to the Telecentres being supported by the CWRC.
 - Achieve autonomy and sustainability
 - Continue to build capacity in the Department of Electrical Engineering

Thank you
The End

