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From N4C and Arctic Action ICT Workshop
Test beds for Rural Communities and Arctic Conditions
Tromso Work Shop
28 January 2010

Upcoming events:
"Future Internet Conference Week"
13-17 December 2010, Ghent, Belgium
Read more!

ICT 2010
Brussels, Belgium
27-29 September 2010
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Tolerant Networks Ltd.
Kerry Hartnett and Dr. Stephen Farrell, N4C partners, have started a company, Tolerant Networks Ltd. which will offer village DTN routers, solar-powered devices, and general DTN support and consulting.

For further information go to:
http://www.tolerantnetworks.com/

Deployment of the N4C
The research project Networking for Communications Challenged Communities: Architecture, Test Beds and Innovative Alliances (N4C) started in May 2008. The vision of N4C is to develop DTN based Internet access, two test beds (in Swedish Lapland and in Kočevje region in Slovenian mountain) and test applications.

But development is just one side of that coin, to find models for deployment of the service is the other. In December 2009 a first issue of N4C exploration plan was presented. That report deals with deployment issues but also facts that N4C uses an Open Source Software (OSS) and therefore the models for governing has to take that into special account.

In this fourth issue of our newsletter (pdf version) we present some of our deployment research. We know from our Search Engine Optimization that N4C work attracts loots of interest round the world. N4C team already has been contacted by researchers from Alaska, Brazil (Amazonas), Malaysia and Mongolia.

We are also very pleased to report that the first N4C Company has been set up. Kerry Hartnett and Dr. Stephen Farrell, N4C partners, have started a company, Tolerant Networks Ltd., which will offer village DTN routers, solar-powered devices, and general DTN support and consulting. We proudly wish Tolerant Networks Ltd. success and a prosperous future!

Dr. Maria Udén, Project Manager

Photo: Ernst Wingborg
Deployment of DTN based Internet access

Exploitation of DTN based Internet access deals with problems that the software which is used is so called Open Source Software (OSS). OSS cannot be easily deployed in Communication Challenged Communities. One reason for that is that the ICT skill levels in such communities is on or below average level. Another is that people in those areas already has more than one job. To work in an OSS platform takes time.

N4Cs business models also have to take into account that future development and maintenance must be financed by other sources than through licensing. Governance of the DTN based Internet access and the test beds thus meet the same challenge that Professor Ellinor Ostrom has analyzed for the commons. Professor Ostrom “has demonstrated how common property can be successfully managed by user associations”. She received the 2009 Nobel Prize in Economics, e.g. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel for her analysis of economic governance, especially the commons”.

In governance N4C has to consider that the implementation should have a positive impact on the local community, supporting and enhancing the local culture and traditions, and that N4C shall employ gender-sensitive design to ensure that the whole community benefits from the project.

N4C Deployment models

But first how can the N4C consortium deploy the DTN based Internet access taking into account that there are very few users both in the Swedish Laponia and in the Slovenian mountains (at least initially)? Where are the financial resources going to come from for up-dating and maintenance of the DTN? To meet the challenge the N4C consortium works with two deployment models.

Private Public Partnership (PPP)

PPP means that responsibility (particularly the financial responsibility) is shared between a single or group of private enterprises and some public authority.

For the Swedish Laponia the N4C plans to use Private Public Partnership (PPP) as the main financial model involving SMEs, municipal and regional authorities as well as broadband deployer and service companies in the county. This model is both going to be trialled for the DTN based Internet access and for the test bed in Swedish Laponia.

In Slovenia the N4C plan is to use a business model where Private enterprises owe and run the DTN based internet access and the test beds.

Governance Models

For managing the DTN based internet access and the test beds N4C plans to start up economic associations. N4C have trialled three levels of deployment for the test beds:

Level 1: The test beds are just floating as a research platform i.e. on similar level as today.

Level 2: Include developing the DTN based Internet access on level 1 to give the Sámi population, hikers’ and researchers Internet connections with DTN. Above that Level 2 will facilitate infrastructure for a small scale test bed for new clients from outside the initial consortium.

Level 3: Include developing the DTN based Internet access so it can both provide network for large scale federated test beds and provide Sámi population and hiker’s Internet connections. This level will be further developed in collaboration with FIRE network.

N4C Test beds models

Level 1. Research platform (as during the N4C FP7 project).
Level 2. Small scale test bed for present research partners and for new clients.
Level 3. Large scale federated test beds in collaboration with FIRE network.
Common Resource Management
N4C have two important research questions to handle:

1. Can the N4C infrastructure and test beds be governed like commons by the user? If so how can this be done interactively with the user?

2. How can gender and cultural issues be safeguarded in the process.

Ostrom’s advice regarding Common Resource Management

1. Clearly defined boundaries (effective exclusion of external unentitled parties);

2. Rules regarding the appropriation and provision of common resources are adapted to local conditions;

3. Collective-choice arrangements allow most resource appropriators to participate in the decision-making process;

4. Effective monitoring by monitors who are part of or accountable to the appropriators;

5. There is a scale of graduated sanctions for resource appropriators who violate community rules;

6. Mechanisms of conflict resolution are cheap and of easy access;

7. The self-determination of the community is recognized by higher-level authorities;

8. In the case of larger common-pool resources: organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level.


Documented interest in DTN technology round the world

- Alaska, USA
- Amazonas, Brazil
- Malaysia
- Mongolia

Deployment of DTN in the Amazonas, Brazil

N4C was represented in EUBR 2009 (September 2009) workshop by Instituto Pedro Nunes (IPN). The EUBR workshop was the result of a joint collaboration between the European Commission, the Ministry of External Relations and the Minister of Science and Technology, with the support of University of São Paulo and University of Brasília, in the context of the Political Dialogue between Brazil and the European Union in the Information Society field. The main goal of the EUBR workshop was to promote collaboration, idea and exchange of experiences and joint research on ICT between Brazilian and European scientific communities, concerning “Future Internet”, “e-infrastructure”, “Microelectronics/Microsystems” and “Embedded System & Control”.

IPN established contact with researchers that were already involved with DTN in Brazil (Professors Otto Duarte and Alfredo Goldman) both demonstrating interest in the N4C concept and technological innovation. The contact resulted in a meeting in October, 2009 in Brazil held by the CERTI foundation in partnership with National Association of Innovative Enterprises Promoting Entities, in Brazil.

CERTI is interested in pilot test using the N4C solutions in the Amazon rainforest. A proposal based on technological development with focus on environmental and economic impact with strong strand on eInclusion will be developed in near future.
Deployment – Mongolia

On the 21 May the N4C project arranged a small workshop at the LTU in Luleå about deployment potential of DTN technology in Mongolia.

Initiator of the meeting was Ms Handmaa Karlsson a former citizen of Mongolia who now is interested in development of ICT applications as a mean to contribute to economic development, democratization, and cultural development in her former homeland.

N4C will make a Pre-Pilot study on what it would demand to make DTN technology available to the rural citizens in Mongolia.

If you are interested to contribute: Please contact: Ms Barbro Fransson  n4c@n4c.eu

From the N4C Workshop in Tromsø

The “Test beds for Rural Communities and Arctic Conditions” workshop took place in Tromsø, Norway, in 28th January of 2010, at NORUT’s facilities. This workshop was a joint arrangement between the N4C project and the Arctic Council Sustainable Development Working Group project.

The main objective of the workshop was to combine impressions, analysis and experiences from the participants, as well as to raise awareness about the potential of taking a proactive approach to the creation of test beds, in northern regions.

Mrs. Annika Sallstrom presented Bothnia Living Lab experience and Mr. Jan Ove Gjerde, Dyroy Energy A/S demonstrated what use the energy sector could have of a testbed in a remote municipality in Northern Norway.

A much appreciated presentation was done with Dr. Richard Beck, form the Barrow Science Consortium. (Read more about deployment potential in Alaska on page 5-6).
DTN in ALASKA

What is the deployment potential for DTN in Alaska? Could DTN technology be used in work with Arctic Observations and Sustainability? That was some of the questions Dr Richard Beck from University of Cincinnati posed to the N4C consortium at the N4C and Arctic Action ICT Workshop in Tromsø 28 January 2010. And the conclusions were convincing which also the fact that the research team from Cincinnati University has considered the N4C and its predecessor SNC as their parent project. But it started in 2002 when the US Senator Stevens asked the scientists in Barrow to assist with tele-education in northern Alaska. University of Cincinnati (UC) mentioned results of UC/NASA distance education efforts with Native American communities in Minnesota and Wisconsin and senator Stevens asks UC to work with NASA on possible solutions for Alaska. The research team has now identified seven basic user communities; telemedicine, education, public, scientific research, local government, federal government, hydrocarbon exploration. The needs are summarized in a pending NSF proposal to CISE and OPP. General arctic communications needs are: Improved Bandwidth (variable depending on application), Real-time, integrated, standards based (IP) data, voice and video (extensible, interoperable) communications, Redundancy (improved reliability), Distribution (improved reliability), Mobility, and Security.

And part of the area is completely isolated during parts of the year.

A vision, is outlined in the needs assessment, and a technology research test bed to provide seamless, high (T-1 to T-3 or 1.5 to 45 Mbit/second) bandwidth for northern Alaska and the Arctic at is the request of Senator Ted Stevens.

Photo: The Arctic Thaw Lakes Project is located in this harsh environment.

The project began with Alaskan Natives on the North Slope of Alaska, one of the most isolated and underserved groups of citizens in the USA. Alaska Natives are what is called eExcluded in Europe meaning they don’t have access to "broadband communication". Communities on the North Slope of Alaska lack access to the rest of Alaska and to US. Like northern Scandinavia the area is also characterized by severe weather and oceanic conditions.

Photo: The research team has equipped three icebreakers with Iridium Open Port Units for remote connectivity but it is not cost-effective for data transfer. DTN icebreakers need a coordinated hand-off to and from the new Barrow Global Climate Change Research Facility with high bandwidth.

Text in this article is based on presentations by Dr Richard Beck and Andrew Rettig and PPTs from the workshop in Tromsø on the 28 January 2010./
According to Dr. Beck there is a good connectivity near two large research centers in northern Alaska but they also need to apply DTN technology to isolated nodes following the model of the SNC/N4C project.

Photo: So Dr. Beck asks - could this be the next Generation Arctic GPSDTN Data Mule?

The research team’s goal is to:

- Create Data Information System
- Use Open Geospatial Consortium (OGC) Standards
- End to End Geographic Information Network

The reason for this is that there is a need for:

- Interoperability
- Scalability
- Extensibility

Ultimately, internet based stationary and mobile location and time aware sensor networks enhanced with DTN.

Or to put it simple: What Dr. Beck and his colleges wants is Coordinated High and Low Bandwidth DTN for Arctic Research.

Where do we go from here?

N4C will continue to collaborate with Dr. Beck and UC within the Arctic Council which is a high level intergovernmental forum. The Artic Council aim to provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic.

Member States of the Arctic Council are Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russian Federation, Sweden, and the United States of America.

Are you interested to learn more about UC and Dr. Beck’s work in Alaska – please contact: n4c@n4c.eu

Do you want to take part in future collaboration in developing DTN for environmental /energy research – Please contact: barbro.fransson@powerlake.se
eBario Experience, Replication & Opportunities

On 15 March 2010 N4C project had a visit from Dr. Alvin W. Yeo, Director, COERI, UNIMAS, Malaysia. In Kelabit Highlands, Bario, Sarawak Malaysia a project is run with aims and approaches similar as the N4Cs. What makes eBario so special is that it deals with eInclusion with aim of sustainability (financial) and for society (Human Resource Sustainability) with empowerment of community, development of skills and proactive use of technology.

The eBario project

- A National Pilot Project on Bridging the Digital Divide
- Multi-Disciplinary Research
- Community Service + Faculty Research
- National and International Research Grants
- Local and Foreign Collaborators/Partners
- Inter-organizational support

Concept and Approach - eBario project

- Participatory Action Research
- Baseline studies

The issue is to understand living conditions, culture, existing uses and access to information sources and their needs for improved information delivery.

- Community Engagement Participation

Is done by formation of Steering Committee where involvement throughout whole project is secured including planning, decision-making, implementing and managing.

- Introduction of Technology

Include Hardware, Software, Internet, Power Generation, Training and Technical Support. The project support national ICT initiatives including e-Learning and e-Community. (Cont. page 8.)

Objectives

- To define the extent to which con-temporary ICT could deliver sustainable social and economic development to remote rural communities.

- To identify further needs and opportunities within such communities that can be satisfied by the innovative use of contemporary ICT.

Photo: In short – the aim of the project is to bring Internet to Bario.

Photo: ICT development also has focus on tourism.

Text in this article is based on presentations by Dr. Alvin W. Yeo, Director, COERI, UNIMAS, Malaysia Sarawak (UNIMAS) on the 15 March 2010 at the LTU, Sweden. For more information please contact: alvin@fit.unimas.my
Lessons Learnt of the eBario project - Malaysia

Deployment potential

The eBario model can be applied to most remote communities in Malaysia and the Asia Pacific region and for that matter also in Europe. However says Dr. Alvin it is important to focus on people, organization, contents and processes rather than just on the technologies. That include:

- Community participation
- That the project focus on relevant needs of the community
- To appoint local champions
- To have a multidisciplinary team
- Smart partnerships including Community, University, Government and Industry
- Sustainable Development with ongoing training and business planning.

Conclusion

The eBario Project has achieved its objective. Contemporary ICTs can deliver sustainable social and economic development to remote rural communities. Key to success in Bario are:

- Community-centered approaches
- Innovative application of ICTs to meet specific needs
- Involvement of local champions
- Holistic approach with multi-partite involvement: of community, industry, government and NGOs.
- Use of appropriate technology - ICT and energy

If you like more information please contact:
alvin@fit.unimas.my

r2sconference in Valencia

If you like to read more about the high-level launch event of the Public-Private Partnership on the Future Internet, Valencia, 13-14 April and the Future Internet Assembly 15-16 April. http://www.future-internet.eu/

ICT 2010

N4C hopes to exhibit Delay and Disruption Tolerant Network Used for Environmental Data Collection from Communication Challenged Regions at the ICT 2010 conference in Brussels, Belgium 27-29 September 2010. Download Where's and How!

PROJECT DETAILS:

Networking for Communications Challenged Communities is funded by the European Commission’s FP7 ICT programme. Grant no. 223994. Project start: 1 May 2008. Duration: 36 months.

READ MORE ABOUT N4C: www.n4c.eu
CONTACT N4C: n4c@n4c.eu