

Arctic Action

Draft Intermediate Report and Recommendations to SDWG

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Dr. Maria Udén, Luleå University of Technology, 97187 Luleå, Sweden.

E-mail: maria.uden@ltu.se

Authors: Maria Udén, Samo Grasic and John Näslund, Luleå University of Technology.

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Annex: Summary of the N4C project

0. SUMMARY

Arctic Action is an initiative to develop solutions for Arctic populations, especially the rural populations. The activity is organized as research and development in the EU FP7 financed project *Networking for Communications Challenged Communities* (N4C), Exchange of ideas between the N4C environment and research and development in U.S.A/Alaska with contact person Richard Beck. The coordinator is Luleå University of Technology in Sweden, with contact person Maria Udén. The present funding allows development within N4C 2008-2011, and idea and know-how exchange with Dr. Beck's U.S.A/Alaska based activities. The present set of Arctic Action will be able to present technical developments of interest for Arctic populations, publicly accessible through the N4C wiki. However, throughout the Arctic there are a number of initiatives to develop, test and implement both technical and business model solutions. Arctic Action could play a supporting role if developed to a platform for exchange of ideas and experiences.

1. THE ARCTIC ACTION ICT INITIATIVE

Even if generic technologies such as TCP/IP have formed the powerful core, the conditions for building and establishing Information and Communication Technologies differ throughout the world. The Arctic conditions challenge ICT state-of-the art both in terms of software, hardware, business models, infra structure and regulations. Arctic Action is an initiative to develop solutions for Arctic populations, especially the rural populations that cannot benefit from technology effectively developed for urban conditions, and for demanding tasks in unsettled areas such as mobile outdoor work e.g. reindeer herding, and climate monitoring.

The activity is organized as: 1. Research and development in the EU FP7 financed project *Networking for Communications Challenged Communities* (N4C). The coordinator is Luleå University of Technology in Sweden (LTU). This European project is a development of the previous nationally funded Sámi Network Connectivity project. The scope of N4C is explained in Appendix.

2. Exchange of ideas between the LTU environment and research and development in U.S.A/Alaska with contact person Richard Beck, University of Cincinnati.

Recommendations

The present funding allows development within N4C, which will be active 2008-2011 (April), and where the activities take place in one Arctic area in Northern Sweden, and idea and know-how exchange with Dr. Beck's U.S.A/Alaska based activities.

However, throughout the Arctic there are a number of initiatives to develop, test and implement both technical and business model solutions.

- Arctic Action could play a supporting role for these initiatives if developed to a platform for exchange of ideas and experiences among people actively involved in such development. Additionally, technically focused initiatives could here be matched with service and business ideas and initiatives for creating sustainable business cases.
- Furthermore, establishing some of the existing initiatives as test beds with interconnected evaluation, bench-marking and dissemination procedures, and with close co-operation between users (local populations) and developers/researchers would be a convincing measure to promote genuine and well functioning ICT for the Arctic economy.

The present set of Arctic Action will be able to present technical developments of interest for Arctic populations, publicly accessible through the N4C wiki, and to sketch some directions for the other factors indicated in the suggestions above.

An Arctic-wide effective impact as sketched above requires dedicated funding. The funding needed can be estimated to the order of 400.000 Euro for a four year exchange platform project including coordinating staff, production of common material and travel/lodging support. Establishment of test beds will have a higher cost, but may if organized in accordance with best practice for ICT R&D show to have great interest for national and other R&D funds.

2. N4C SUMMER TESTS IN SWEDEN 2008

The aim of the first N4C summer tests was to try and check the legacy hardware and software from the previous SNC project. It gave the people involved a chance to get to know the current hardware and software solutions. The Swedish part of the tests was done in Lapland's hard to access mountain area, focusing on the actual use of various services using the DTN and ProPHET platform.

The tests in Sweden involved both the local community of Sámi reindeer herders and tourists. The first week was between the 4th August 2008 and 8th August 2008. The second week took place between the 11th August 2008 and 15th August 2008. This test was performed with the same configurations as the previous SNC tests but with a new version of the key software, PROPHET. Because we were testing with a new version of the software we took the decision to start first week of testing in Saltoluokta so that we easier could solve any upcoming problems (closer to electricity, telephones and internet). Additional information: www.n4c.eu

The second week of testing was located in Staloluokta which is located further up in the mountains in a road less area. All the used equipment were powered and charged only by using two 80W solar panels and three 12V 80A/h solar batteries. Users were able to send and receive emails and check cached web pages that were predefined for web caching on the gateway, on three Nokia PDAs. There was also a chance to use any other computer with the WIFI network adapter set to ProPHET Ad-Hoc network. During the second week we were also able to remotely (from the test field) update the test blog on the Internet.

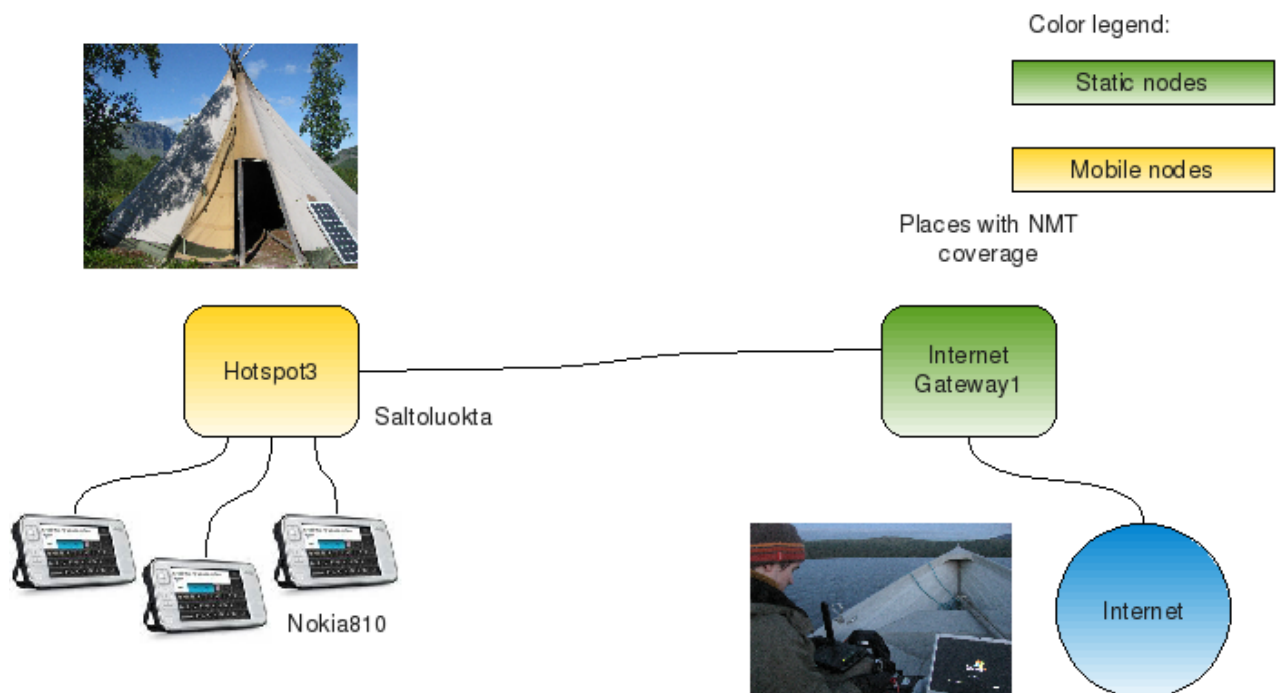


Figure: First week's network topology used in Sweden

Topology

Two different topologies and test places were used in test in Sweden. First one was a trivial regarding the routing itself and it was done in small Sami village Saltoluokta during first week of testing. Only two nodes were used during testing. One of them was used as a hotspot and the second one as a gateway. The aim of this test was to check whether email and web caching services works well. For the Internet connection an NMT modem was used. When there was a need to connect a gateway to the Internet we used boat and/or car to drive few kilometres down along the river to send and receive emails and web cached web pages, because there was no NMT coverage in Saltoluokta. This was done on a daily bases.

For the second week of tests three more nodes were used (beside hotspot and gateway) as carriers. Gateway was placed inside the cabin at the Fyskflyg's helicopter base in Ritsem. Two of the relaying nodes were mounted inside two helicopters. One of the relaying nodes was placed on one of the mountains on a flight route between Ritsem and Staloluokta. Staloluokta is a small Sami village located approximately 60km from Ritsem and it is close to the Norwegian border. There is no electricity and it is accessible only by walking (4 days walk) or flying.

The only carriers were helicopters which were flying daily from their helicopter base in Ritsem to Staloluokta. There is one scheduled flight every day at 14h. Anyhow we had some luck at that time because they were rebuilding bridges during our test time, so we had on average at least two flights every day (sometimes even more).

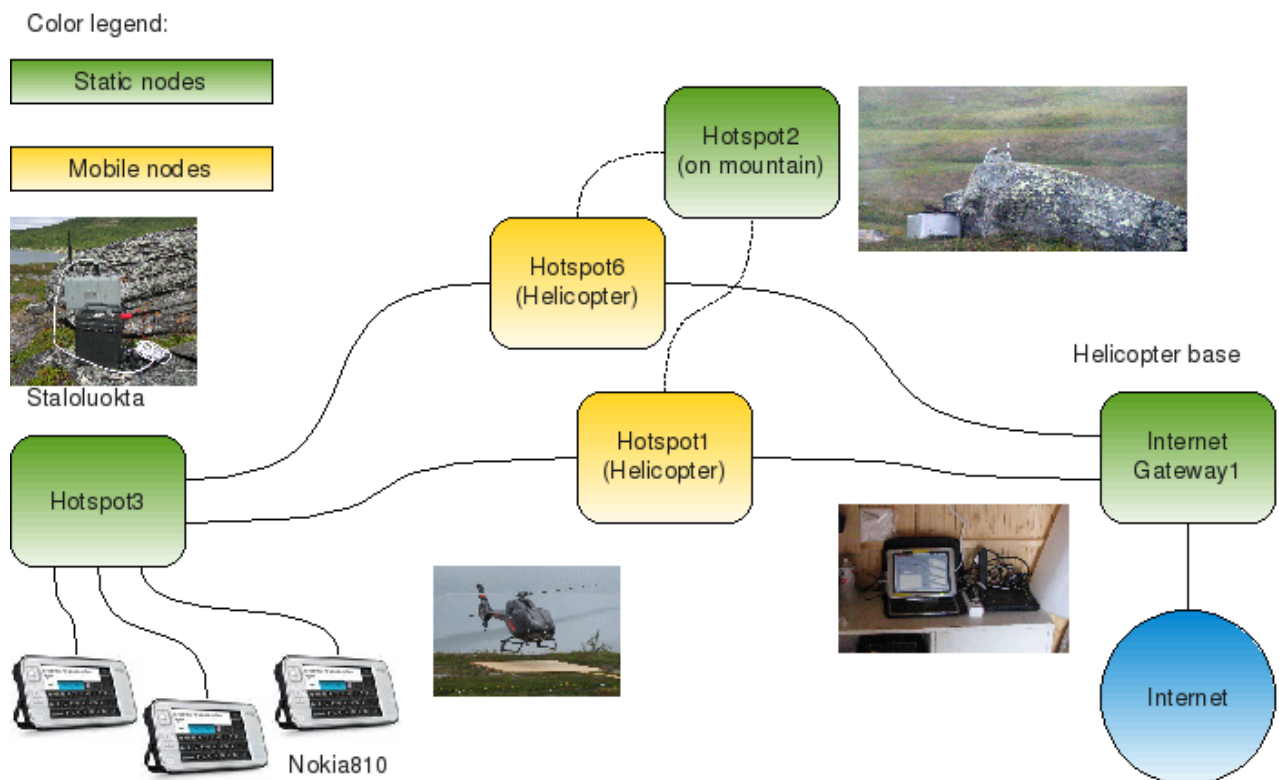


Figure: Second week's network topology used in Sweden

**SEVENTH FRAMEWORK PROGRAMME
THEME [ICT-2-1.6]**

New paradigms and experimental facilities

**Grant agreement for: Small or medium-scale focused research project
STREP - CP-FP-INFOSO**

Annex I - "Description of Work"

Project acronym: N4C

Project full title: **Networking for Communications Challenged Communities:
Architecture, Test Beds and Innovative Alliances**

Grant agreement no.: Fp7-223994

Date of preparation of Annex I (latest version): 2008-04-03

Date of approval of Annex I by Commission: 2008-04-03

List of Beneficiaries

Beneficiary Number.	Beneficiary name	Beneficiary short name	Country	Date enter project**	Date exit project**
1 Coordinator	Luleå tekniska universitet	LTU	Sweden	Month 1	Month 36
2	Albentia Systems, S.A.	ALBENTIA	Spain	Month 1	Month 36
3	Universidad Politécnica de Madrid	UPM	Spain	Month 1	Month 36
4	INTEL PERFORMANCE LEARNING SOLUTIONS Ltd.	Intel	Ireland	Month 1	Month 36
5	The Provost Fellows and Scholars of the College of the Holy and Undivided Trinity of Queen Elisabeth Near Dublin	TCD	Ireland	Month 1	Month 36
6	Northern Research Institute Tromsø AS	NORUT	Norway	Month 1	Month 36
7	ITTI Ltd.	ITTI	Poland	Month 1	Month 36
8	Instituto Pedro Nunes - Associação para a Inovação e Desenvolvimento em Ciência e Tecnologia	IPN	Portugal	Month 1	Month 36
9	MEIS storitve za okolje d.o.o.	MEIS	Slovenia	Month 1	Month 36
10	Tannak AB	TANNAK	Sweden	Month 1	Month 36
11	Power Lake AB	PLAB	Sweden	Month 1	Month 36
12	Folly Consulting Ltd.	FOLLY	UK	Month 1	Month 36

*IPLS will carry out the work indicated in Annex I with resources made available at the request of IPLS by its mother company Intel Ireland Ltd on the basis of an inter company agreement. These resources are reimbursed by IPLS to Intel Ireland Ltd on the basis of the actual costs incurred by Intel Ireland Ltd.

Project Number ¹	223994	Project Acronym ²	N4C
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ONE FORM PER PROJECT

GENERAL INFORMATION

Project title ³	Networking for Communications Challenged Communities: Architecture, Test Beds and Innovative Alliances		
Starting date ⁴	01/05/2008		
Duration in months ⁵	36		
Call (part) identifier ⁶	FP7-ICT-2007-2		
Activity code(s) most relevant to your topic ⁷	ICT-2007.1.6: New paradigms and experimental facilities		
Free keywords ⁸	internet for all, rural broadband, nomadic, test beds, delay tolerant networking, opportunistic, air interface technologies, pervasive applications, climate, cattle and animal tracking, web caching		
Abstract ⁹ (max. 2000 char.)			
<p>Leveraging diverse technologies in a coherent future Internet test bed is difficult. Extending the reach of such a test bed to people living in remote areas, that have special complex requirements, adds to the challenge. The target of the N4C project is the deployment and testing of ubiquitous and pervasive networking for communications challenged communities in a manner consistent with an overall vision for a future Internet that can encompass not just users and applications in well connected regions, but that can also reach out to rural areas. To achieve this goal N4C will make opportunistic use a range of communications access methods, but with a special focus on the presently evolving Delay and Disruption Tolerant Networking (DTN) architecture and related technologies that have mainly been developed by the Internet Research Task Force (IRTF) DTN community. DTN technology will be used to meet some specific goals for future Internet scenarios like methods of delivering information on global warming in almost inaccessible areas and providing means for including remote populations in future Internet society thus contributing to EC objectives eInclusion and Broadband for all. A set of initial applications with specialized software and hardware will be tested in Sápmi/Lapland in northern Sweden where a nomadic way of life is common and in Kocevje region in Slovenia. This will evolve into an on-going test bed for applications providing communications in challenged areas. The intent is that N4C will become an extension of a more general federated future Internet test bed for use in more traditionally connected regions. N4C will demonstrate sustainable business models for deployment of its outcomes. The impetus of working together in the FP7 framework will significantly improve the utility of the results by ensuring that they are applicable to several differing scenarios and assist with the goal of giving European leadership in the standardization of DTN technology.</p>			