



Networking for Communications Challenged Communities:  
Architecture, Test Beds and Innovative Alliances  
Contract no: 223994

---

# WP3

## N4C Verbal log Norut Summer Test 2010



---

### Norut

Arne-Wilhelm Theodorsen, Sigurd Sjursen, Karl Johan Grøttum  
Postal address: P.O.Box 6434 Forskningsparken, 9294 Tromsø, Norway  
Tel: +47 776 29400  
Fax: +47 776 29401  
[www.norut.no](http://www.norut.no)  
[sigurd.sjursen@norut.no](mailto:sigurd.sjursen@norut.no)

## ABSTRACT (Max 400 word)

The second N4C Norut Summer Test took place in Staloluokta, Sweden the 16<sup>th</sup> to 19<sup>th</sup> of August 2010. The development of the Hiker's app in WP3 is in its final stage where we are concentrating on the integration of the DTN2 for the PDAs and net book computers. The hardware is standard of-the-shelf units designed for an office environment, and we need to test how the components behave in a realistic field environment. The tests are done with Nokia N900s, N810s and Asus Eee PCs. The type of questions we would like to investigate is: Maximum distance of communication with standard Wi-Fi cards, and test of communication using DTN2 software.

Due date of deliverable: date/month/year Actual submission date: date/month/year

Document history		
Status	Date	Author
Initial Draft	03-09-2010	Karl Johan Grøttum
First draft circulated to consortium	11-11-2010	Karl Johan Grøttum
Feedback		
Submission to EC		

Dissemination level	
	Level
<b>PU</b> = Public	
<b>PP</b> = Restricted to other programme participants (including the Commission Services).	X
<b>RE</b> = Restricted to a group specified by the consortium (including the Commission Services).	
<b>CO</b> = Confidential, only for members of the consortium (including the Commission Services).	

## CONTENT

1.N4C Norut Summer Test 2010 .....	4
2.Test of DTN connection to Internet.....	5
3.Test of range for Nokia N810s.....	7
4.Test of photoblog via DTN2 for Nokia N810s.....	13
5. Powergorilla and solargorilla.....	14
6.Sync of Map Cache, sync of POI and sync of Geoblog message with own position.....	14

## FIGURES

Figure 1: DTN planned for test.....	4
Figure 2: Facebook photo from NSIM email service.....	6
Figure 3: N4C Hiker's application on lars-n810.....	7
Figure 4: Hiker's app range test: lars-n810: 1 m to norut-n810 and 73 m to staale-n810.....	8
Figure 5: Hiker's app range test: lars-n810: 10 m to norut-n810 and 105 m to staale-n810.....	8
Figure 6: Hiker's app range test: lars-n810: 45 m to norut-n810 and 74 m to staale-n810 which has been unreachable for 47 seconds.....	9
Figure 7: Hiker's app range test: lars-n810: 74 m to norut-n810 and 55 m to staale-n810 which has been unreachable for 1 minute and 26 seconds.....	9
Figure 8: Hiker's app range test: lars-n810: 214 m to norut-n810 and 95 m to staale-n810 which has been unreachable for 4 minutes and 58 seconds.....	10
Figure 9: Hiker's app range test: lars-n810: 227 m to norut-n810 and 30 m to staale-n810....	10
Figure 10: Hiker's app: Photo blog on lars-n810.....	11
Figure 11: Log of file sync with byte per second vs. file size in bytes.....	11
Figure 12: Log of file sync with byte per second vs. distance between N810s.....	12
Figure 13: Log of file sync with byte per second vs. distance between N810s.....	12
Figure 14: Index of hikers_pda_pics at Rosebud transferred via DTN2.....	13

## 1. N4C Norut Summer Test 2010

**Date:** 16.08.2010 – 19.08.2010

**Location:** Staloluokta, Sweden

**Participants:** Arne-Wilhelm Theodorsen, Karl Johan Grøttum

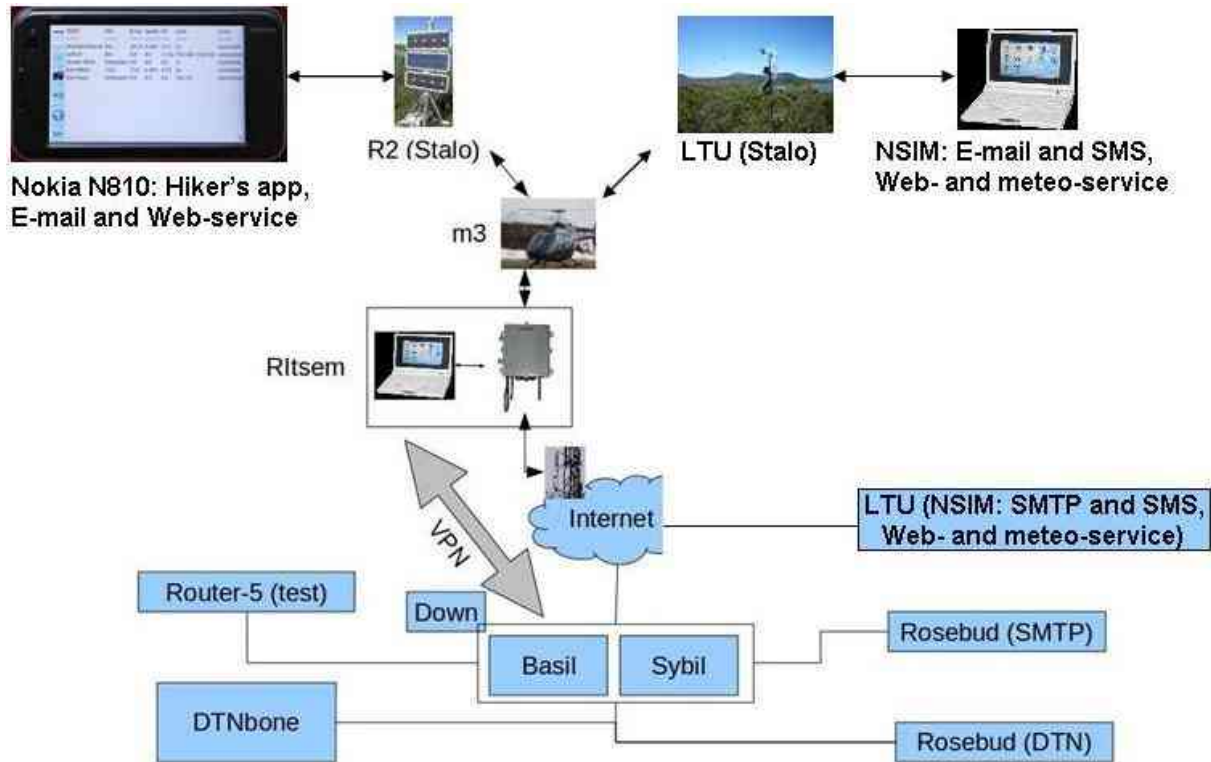


Figure 1: DTN planned for test.

This is not a formal report, it is a transcript of the notes taken during the test days. The test report based on the log files and these notes will be published later.

The location is Staloluokta. It was chosen because

- There is no mobile phone connection
- There is Wi-Fi connection
- There is no power connection, however, there are solar power panels for charging of batteries etc.
- It is accessible by helicopter
- It has all equipment for surviving in the field (beds, chairs and a small kitchen)

**Hardware for the tests:**

2 Asus Eee PC 900 (*seftref and n4c-asus*), 2 Nokia N900 (*norut-n900, n4c-n900*), 3 Nokia N810 (*norut-n810, staale-n810 and lars-n810*). Powergorilla (portable high energy robust rechargeable battery), solargorilla (compact and portable high energy robust solar panel) and Solio (hybrid solar charger).

*In addition we had walkie-talkie handsets for efficient communication during the distance tests.*

**Sunday 15.08.2010 10:00 – 17:00**

Preparation of the test equipment at Norut office.

Charging all batteries for PC and PDAs.

Set-up and last minute updates of the test software: DTN2 and Hikers App integrated.

**Departure by car to Kiruna Monday 16.08.2010 09:00 – 16:00**

After 5 hours 20 minutes driving we arrived at Kiruna Airport where we waited for the helicopter that would fly us in to the wilderness.

**Arrival at Staloluokta at 17:30:**

Inspection of test area.

Installation of test gear and personal effects in N4C cabin. Established WiFi contact with one village router (R2 Stalo in : IP-address: 10.125.14.13, DTN-EID: n4crouter-2) outside the main tourist cabin, next to weather station/wind generator above helipad.

Dinner was served by Arne-Wilhelm. Checking of test equipment, and walk-through of the test procedures.

*Communication test of 4 walkie-talkie handsets to be used during distance tests.*

At 22:00 the routers shut down, and that was the end of testing for the first day.

## 2. Test of DTN connection to Internet

**Tuesday 17.08.2010 09:00 – 22:00 at Staloluokta.**

Testing of NSIM, NSIM email and NSIM SMS. Accounts setup by Samo did not work at the morning (09.00), but after the helicopter had been there (13.20) all accounts were working. (Thanks, Samo!). NSIM email and SMS did arrive to destinations, but were delayed until Friday 20.08.2010 and Saturday 21.08.2010.

Sent photo to facebook mobile upload by using the NSIM email service, and it appeared at facebook 20.08.2010.



Figure 2: Facebook photo from NSIM email service.

*Logs on the computer in the N4C cabin will give the more complete picture.*

Web cache for DN.se Nyheter at the N4C village router 2 was stamped 16.08.2010 05:58:19. Log in to village-email at N4C village router 2 (R2 Stalo in ) did not succeed for anyone.

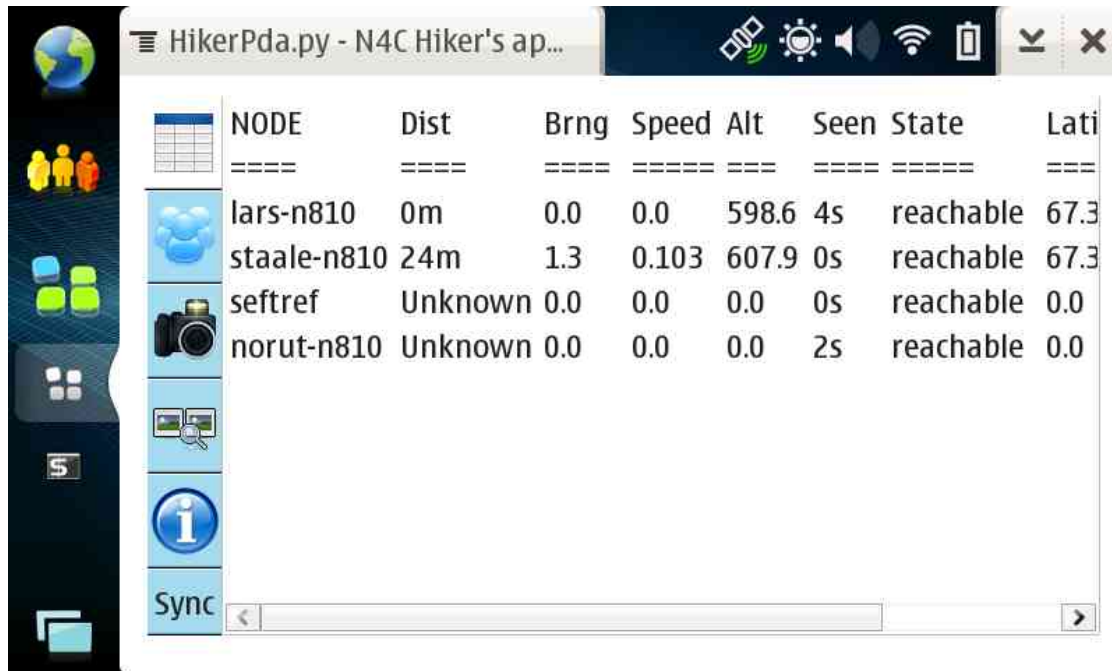
We tried to connect norut-n900 at N4C village router 1 and 2. Got ip address 10.125.14.132 from R1 (Spare), and 10.125.14.75 from R2 (Stalo). Tested Hikers app while connected to

router 2, and sent 5 photos. Due to wrong ip-addresses in the dtn.conf file, none of these images reached their destination (rosebud: dtn://dtbone-2010/gateway.nomadic.n4c.eu/jpg).

### 3. Test of range for Nokia N810s

**Wednesday 18.08.2010 08:30 – 11:40**

We connected lars-n810, staale-n810, seftref and norut-n810 to n4c-village router 2 using wifi in infrastructure mode (not ad-hoc). After a minute or two, lars-n810 and staale-n810 got GPS fix. Seftref and lars-n810 were placed next to the n4c-village router 2.



NODE	Dist	Brng	Speed	Alt	Seen	State	Lati
====	====	====	====	====	====	====	====
lars-n810	0m	0.0	0.0	598.6	4s	reachable	67.3
staale-n810	24m	1.3	0.103	607.9	0s	reachable	67.3
seftref	Unknown	0.0	0.0	0.0	0s	reachable	0.0
norut-n810	Unknown	0.0	0.0	0.0	2s	reachable	0.0

Figure 3: N4C Hiker's application on lars-n810.

NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude	Lon
lars-n810	0m	0.0	0.0	598.6	5s	reachable	67.318758	16.6
staale-n810	73m	83.4	0.823	602.4	2s	reachable	67.318581	16.6
seftref	Unknown	0.0	0.0	0.0	1s	reachable	0.0	0.0
norut-n810	1m	166.4	0.051	600.1	1s	reachable	67.318761	16.6

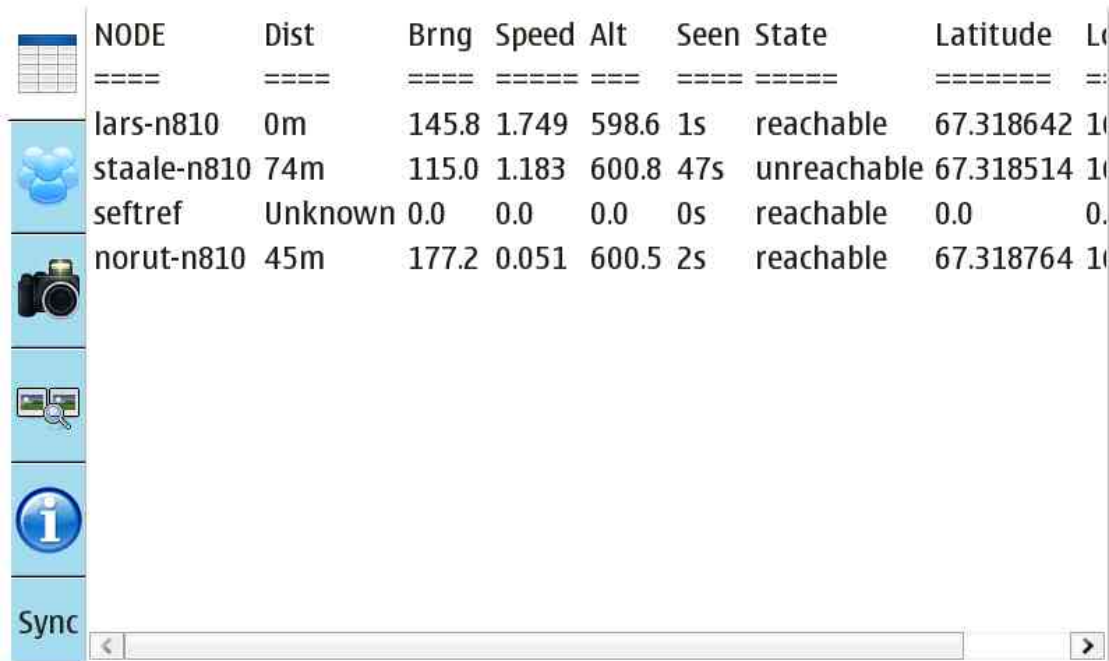
Figure 4: Hiker's app range test: lars-n810: 1 m to norut-n810 and 73 m to staale-n810.

Arne-Wilhelm started to walk up the hill carrying staale-n810, and after a while norut-n810 also got GPS fix. Seftref was not connected to USB-GPS, because it drains the battery.

NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude	Lon
lars-n810	0m	0.0	0.0	598.6	6s	reachable	67.318667	16.6
staale-n810	105m	299.4	0.36	599.6	0s	reachable	67.318483	16.6
seftref	Unknown	0.0	0.0	0.0	0s	reachable	0.0	0.0
norut-n810	10m	156.0	0.051	600.6	5s	reachable	67.318763	16.6

Figure 5: Hiker's app range test: lars-n810: 10 m to norut-n810 and 105 m to staale-n810.

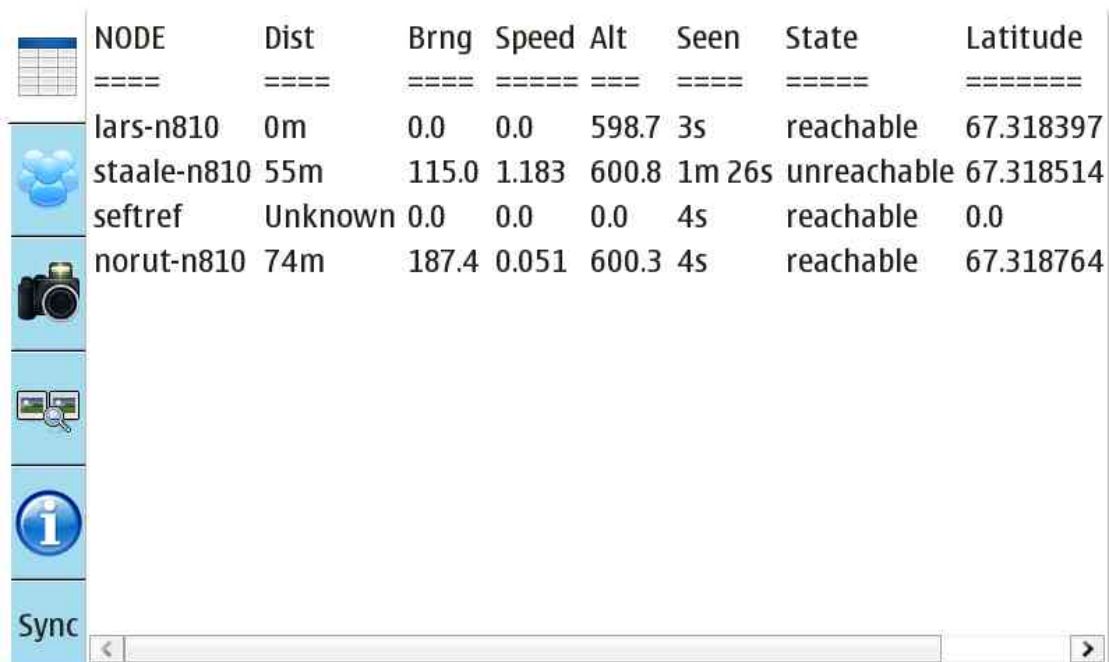
Arne-Wilhelm walked 105 meters up the hill carrying staale-n810, and the connection was ok for a distance of more than 200 meters. He lost connection with the n4c-village router, maybe because he lost line of sight being behind the Chapel.



NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude
lars-n810	0m	145.8	1.749	598.6	1s	reachable	67.318642
staale-n810	74m	115.0	1.183	600.8	47s	unreachable	67.318514
seftref	Unknown	0.0	0.0	0.0	0s	reachable	0.0
norut-n810	45m	177.2	0.051	600.5	2s	reachable	67.318764

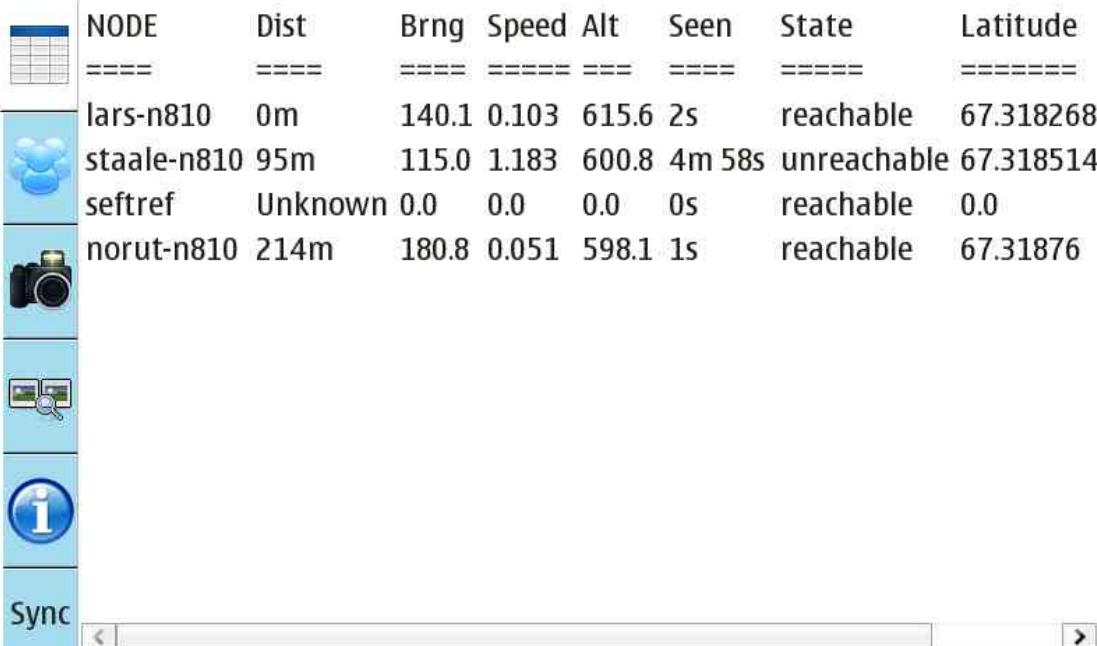
Figure 6: Hiker's app range test: lars-n810: 45 m to norut-n810 and 74 m to staale-n810 which has been unreachable for 47 seconds.

Staale-n810 did not recover the wifi connection at first, so we switched n810s. Arne-Wilhelm carried the norut-n810, while I was checking what was wrong with staale-n810.



NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude
lars-n810	0m	0.0	0.0	598.7	3s	reachable	67.318397
staale-n810	55m	115.0	1.183	600.8	1m 26s	unreachable	67.318514
seftref	Unknown	0.0	0.0	0.0	4s	reachable	0.0
norut-n810	74m	187.4	0.051	600.3	4s	reachable	67.318764

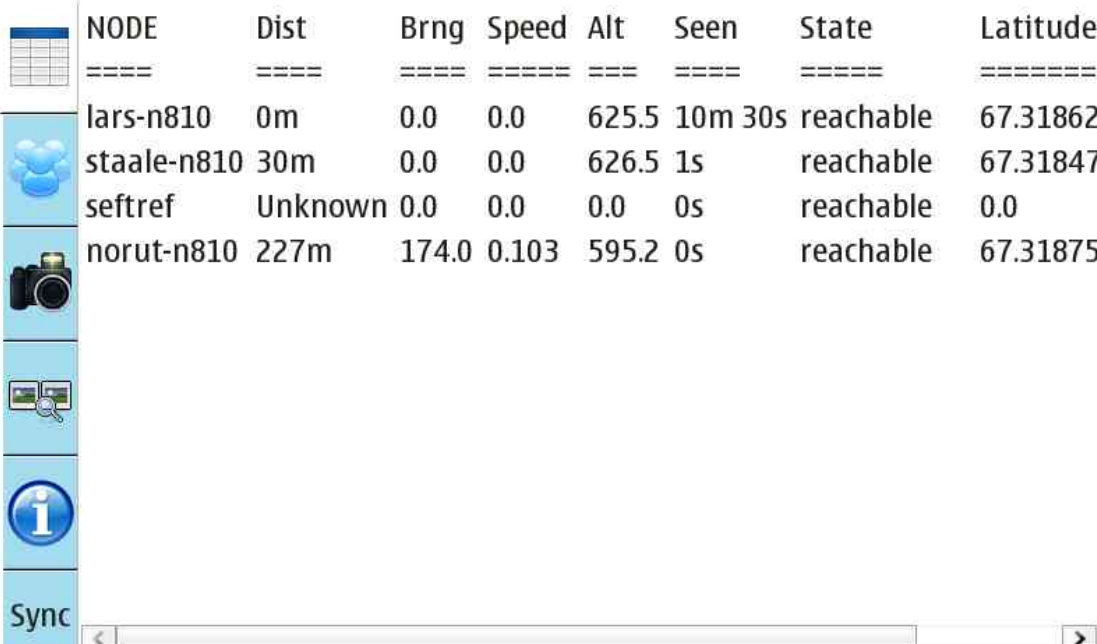
Figure 7: Hiker's app range test: lars-n810: 74 m to norut-n810 and 55 m to staale-n810 which has been unreachable for 1 minute and 26 seconds.



NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude
lars-n810	0m	140.1	0.103	615.6	2s	reachable	67.318268
staale-n810	95m	115.0	1.183	600.8	4m 58s	unreachable	67.318514
seftref	Unknown	0.0	0.0	0.0	0s	reachable	0.0
norut-n810	214m	180.8	0.051	598.1	1s	reachable	67.31876

Figure 8: Hiker's app range test: lars-n810: 214 m to norut-n810 and 95 m to staale-n810 which has been unreachable for 4 minutes and 58 seconds.

Staale-n810 stayed unreachable for more than 5 minutes, but did recover the wifi connection.



NODE	Dist	Brng	Speed	Alt	Seen	State	Latitude
lars-n810	0m	0.0	0.0	625.5	10m 30s	reachable	67.31862
staale-n810	30m	0.0	0.0	626.5	1s	reachable	67.31847
seftref	Unknown	0.0	0.0	0.0	0s	reachable	0.0
norut-n810	227m	174.0	0.103	595.2	0s	reachable	67.31875

Figure 9: Hiker's app range test: lars-n810: 227 m to norut-n810 and 30 m to staale-n810.

Arne-Wilhelm walked up the hill carrying norut-n810, trying to have line of sight to the n4c-village router. The **maximum range** we measured from screen dumps where **227 meters**, and the **maximum range** we got from the log files were **248 meters**.



Figure 10: Hiker's app: Photo blog on lars-n810.

The pictures shown twice, where synced automatically when taken, and then sent once again manually.

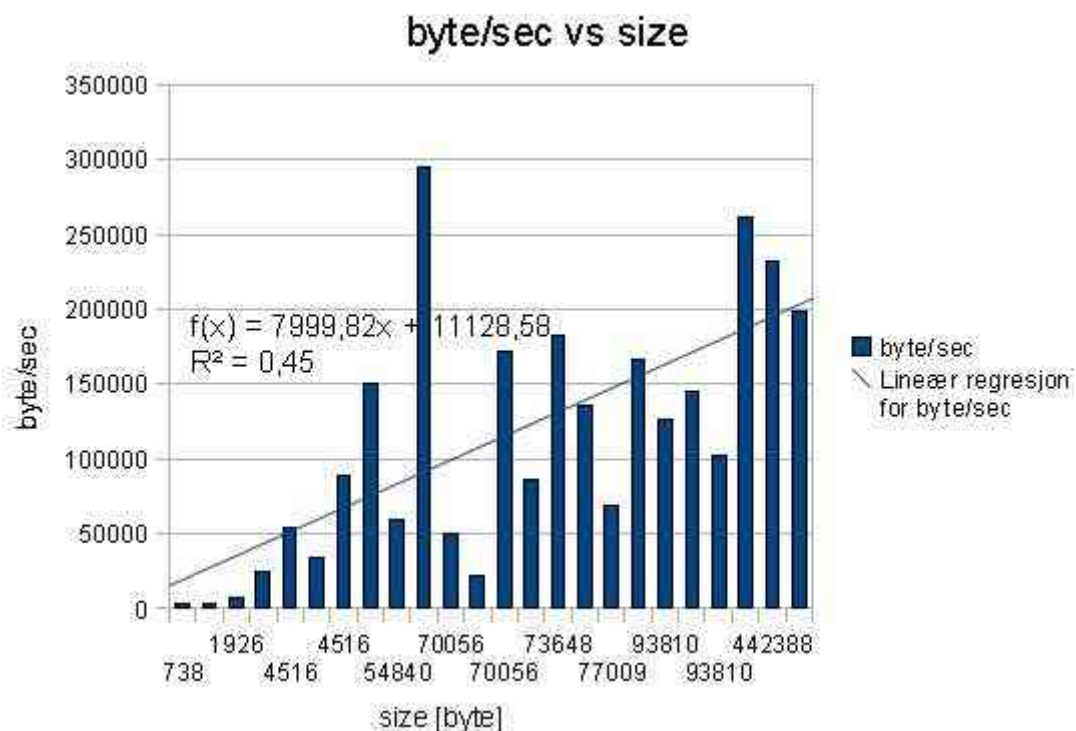


Figure 11: Log of file sync with byte per second vs. file size in bytes

Data transfer rate is depending on the fact that big files make TCP more efficient, obtaining better transfer rates. We experienced a **data transfer rate** with an **average of 800 Kbps**.

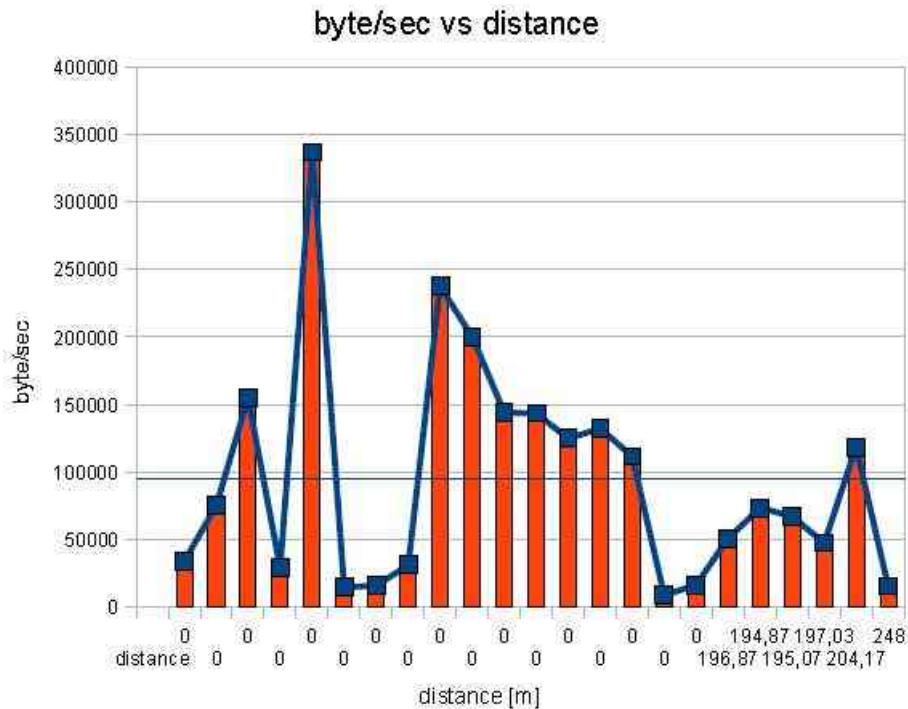


Figure 12: Log of file sync with byte per second vs. distance between N810s

The **maximum range** we measured was **248 meters**.

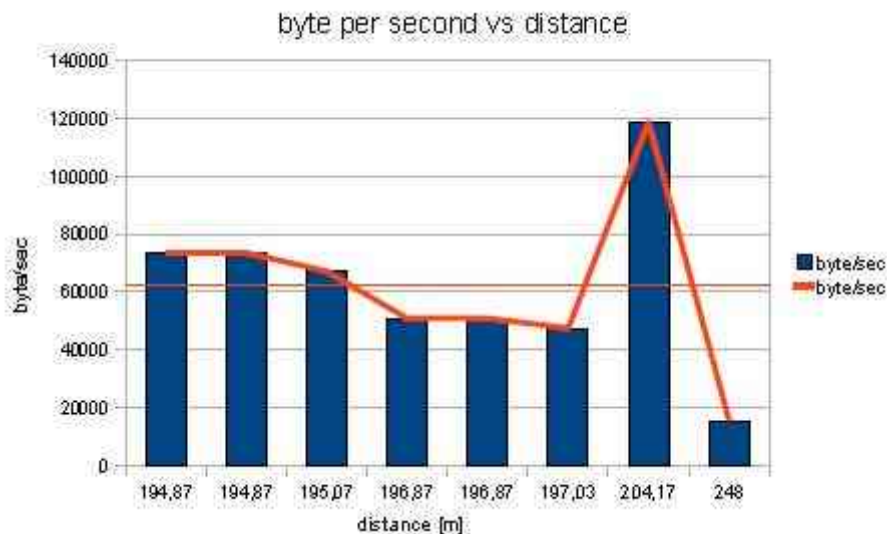


Figure 13: Log of file sync with byte per second vs. distance between N810s

The **data transfer rate** decreases to an **average of about 500 Kbps** when only the measurements with distances between 194 and 250 meters are taken into consideration.

## 4. Test of photoblog via DTN2 for Nokia N810s

The pictures listed below and shown in Figure 10 were sent from 3 Nokia N810s running Hikers app. The pictures were sent via DTN2 running at N4C Village router 2 during the range test. They were received at Rosebud (info.n4c.eu) from 11:32 to 13:24 the same day.



<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
 <a href="#">Parent Directory</a>		-	
 <a href="#">geoblog/</a>	24-Jul-2010 14:30	-	
 <a href="#">gpslog/</a>	24-Jul-2010 14:30	-	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:32	66K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:33	66K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:34	72K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:35	92K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:38	92K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:38	68K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:39	75K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:39	75K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 11:40	68K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 13:24	92K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 13:24	64K	
 <a href="#">picture-2010-08-17-1..&gt;</a>	18-Aug-2010 13:24	64K	
 <a href="#">pictures/</a>	24-Jul-2010 14:30	-	

Apache Server at info.n4c.eu Port 80

Figure 14: Index of hikers\_pda\_pics at Rosebud transferred via DTN2.

## 5. Powergorilla and solargorilla

Powergorilla: Lightweight (700g), portable (220 x 130 x 15mm)

Output capacity:

21,000	mAh in	5V	mode
12,500	mAh in	8.4V	mode
11,000	mAh in	9.5V	mode
8,750	mAh in	12V	mode
6,500	mAh in	16V	mode
5,500	mAh in	19V	mode
4,200	mAh in	24V	mode

Output currents:

5V:	1A	Max
8.4V/9.5V/12V:	3A	Max
16V:	2.5A	Max
19V:	2.5A	Max
24V:	1.5A	Max

Solargorilla: Lightweight (820g), portable (264 x 200 x 19mm)

Output capacity:

500mAh @ 20V  
 500mAh @ 5V  
 Max: 1000 mAh @ 5V USB

We experienced that it was possible to charge the powergorilla with the solargorilla during the morning, and then charge the Asus netbook with the powergorilla for a couple of hours. When there was clear sky it was possible to charge the powergorilla once more before the sun set, and then charge the Asus during the night.

## 6. Sync of Map Cache, sync of POI and sync of Geoblog message with own position

(Not performed).

**Thursday 19.08.2010** 09:00-11:00: TCD equipment where packed for helicopter flight, but we left one router running so Karin could read her village email, including an email from Shane Brodie, Intel. We tried to send some more village emails, but none of them got sent because the n4c-village router was turned off before all bundles were transferred to the helicopter. Generally the pilots seem to be in a hurry, so the helicopter stays to short time on the ground for all bundles to be transferred.

16:00 Helicopter to Kiruna.

17:00-23:00 Returned to Tromsø by car.