WP3
N4C Verbal log Norut
Summer Test 2010
ABSTRACT (Max 400 word)

The second N4C Norut Summer Test took place in Staloluokta, Sweden the 16th to 19th 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.
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1. N4C Norut Summer Test 2010

Date: 16.08.2010 – 19.08.2010
Location: Staloluokta, Sweden
Participants: Arne-Wilhelm Theodorsen, Karl Johan Grøttum

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 (sefirez 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), solargarilla (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://dtnbone-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.

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

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.
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.

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.
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.

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.

![Graph of byte/sec vs size](image)

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

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.

![Index of /hikers_pda_pics](http://info.n4c.eu/hikers_pda_pics/)

**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:

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Voltage</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>21,000 mAh</td>
<td>5V</td>
<td></td>
</tr>
<tr>
<td>12,500 mAh</td>
<td>8.4V</td>
<td></td>
</tr>
<tr>
<td>11,000 mAh</td>
<td>9.5V</td>
<td></td>
</tr>
<tr>
<td>8,750 mAh</td>
<td>12V</td>
<td></td>
</tr>
<tr>
<td>6,500 mAh</td>
<td>16V</td>
<td></td>
</tr>
<tr>
<td>5,500 mAh</td>
<td>19V</td>
<td></td>
</tr>
<tr>
<td>4,200 mAh</td>
<td>24V</td>
<td></td>
</tr>
</tbody>
</table>

Output currents:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V</td>
<td>1A</td>
</tr>
<tr>
<td>8.4V/9.5V/12V</td>
<td>3A</td>
</tr>
<tr>
<td>16V</td>
<td>2.5A</td>
</tr>
<tr>
<td>19V</td>
<td>2.5A</td>
</tr>
<tr>
<td>24V</td>
<td>1.5A</td>
</tr>
</tbody>
</table>

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.