



NORDISKA KOMMISSIONEN FÖR GEODESI

Ordförande
BJÖRN ENGEN
Statens Kartverk
Kartverksvn 21
N-3500 Hønefoss
NORGE

Sekreterare
BO JONSSON
Lantmäteriverket
LF-Geodesi
SE-801 82 Gävle
SVERIGE

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The NKG Steering Committee on the on-going sub-projects for "NORDIC POSITIONING SERVICE"

Minutes of the 10th meeting

Hønefoss, Norway - March 6-7, 2002

PRESENT

Denmark: Sigvard Stampe Villadsen
Bo Madsen

Finland: No representative

Norway: Björn Engen
Rune Hanssen
Reidun Khalayli, ITEM 7

Sweden: Bo Jonsson
Andreas Engfeldt (Secretary)

ITEM 1: OPENING OF THE MEETING

Björn Engen welcomed everybody to the 10th meeting of the NKG Steering Committee on the on-going sub-projects for "Nordic Positioning Service".

The Steering Committee agreed to the following agenda for the meeting

1. Opening
2. Minutes from the 9th Steering Committee meeting on November 22-23 in Gävle
3. Status of the application to "Nordisk Industrifond"

4. Information from the meeting of the Director Generals January 2002 in Iceland
5. Status of a computer network between the Nordic control centres
6. Status of the sub projects
 - A0 – Standard for reference stations
 - A1 – Web-site
 - A2 – Automated Computation Service
 - B – Real time service with 0.5 m accuracy
 - C1A – Distribution channel for RTK
 - C1B – Evaluation of RTK algorithms
7. Draft of the Agreement on Exchange of data between the Nordic countries
8. Distribution of information from the meetings of the Steering committee
9. Ongoing activities
10. Future work
11. Other items
12. Next meeting and closing

ITEM 2: MINUTES FROM PREVIOUS MEETING

Minutes from the 9th Steering Committee meeting on November 22-23 was approved, with the comment from Stampe to Item 6, sub-project C1A. The word "asked" should be changed to "suggested" in the sentence which now should look as follows: "KMS has suggested Trimble to modify their software in order to broadcast single station RTK data if the rover is closer than a certain limit".

ITEM 3: STATUS OF THE APPLICATION TO "NORDISK INDUSTRIFOND"

In the beginning of June Björn E. prepared an application for funds to the project "A Nordic Positioning Service" and sent it to "Nordisk Industrifond". After a few weeks he was asked to describe the financing of each sub-project

separately. An updated version of the application was sent to "Nordisk Industrifond" on the 9th of July.

At a meeting of the board of "Nordisk Industrifond" two weeks ago it was decided that no funds would be allocated to the project "A Nordic Positioning Service". No reason for rejection of the application of funds was given in the letter to Björn E., see Appendix A. By phone Björn has found that one of the reasons for the rejection can be that all the project partners are governmental agencies. The Steering Committee decided to inform The Norwegian Ministry of Environment, The Norwegian Foreign Ministry and The Nordic Minister Council, and the Director Generals about the rejection of the application by writing a letter. This letter will also be copied to "Nordisk Industrifond".

ITEM 4: INFORMATION FROM THE MEETING OF THE DIRECTOR GENERALS JANUARY 28-30, 2002

The Director Generals had a meeting on Iceland on January 28-30, 2002. None in the Steering Committee was participating in the meeting. But a small orientation about the project, written by Björn E. and Bo J., was on the agenda, see Appendix B.

ITEM 5: STATUS OF A COMPUTER NETWORK BETWEEN THE NORDIC CONTROL CENTRES

The specification for the computer network between the control centres in Denmark, Norway and Sweden can be found in the document "NKG Network - Architectural Design", which was updated on 20th of November, see Minutes from the Meeting in Gävle in November 2001. The Steering Committee approved the document.

Rune H. reported that the connection to Denmark was installed on March 5th (the day before the Meeting), which means that it is three Months delayed. It will probably work within a few days. Rune checked with Örjan Zackrisson the status of the connection in Sweden, no success. The connection to Norway has been working for a while and some successful simulations have been done.

There have been some problems with the transfer of GPS-data from SWEPOS to SATREF. When there's too much strain on the network time-delays occurs. The usual delay is on the level 5-10 seconds, but sometimes it can increase up to 90 seconds.

ITEM 6: STATUS OF THE SUB PROJECTS

A0 - A Nordic standard for reference stations

Nothing has happened since the last Steering Committee Meeting in November 2001.

A detailed document of the classification of the reference stations has been developed. Gunnar Hedling, the chair of the sub project, will send the document to the members of the sub project, to the Steering Committee and to other involved persons for comments latest in April 2002. The document will then be approved at the next meeting of the Steering Committee, on June 13-14, 2002.

The next step is to make an inventory of the existing Nordic reference stations. A standard form, based on e.g. an Access database, should be used. Based on this inventory and the existing standards for IGS and EUREF stations the sub-project shall propose a long-term standard for the design of Nordic reference stations.

A1 - A Nordic Web-site for download of reference station data for post-processing purposes

The aim is to establish a common Nordic Web-site for download of post-processing data from all the Nordic permanent stations.

The first goal is to implement a common Web portal at each control centre of the Nordic networks of permanent reference stations, taking in consideration the existing pricing policy in each country. An agreement for the exchange of GPS-data between the Nordic countries will be developed (see Item 7 below). The long-term goal is to specify and establish a common pricing policy.

The standard is ready and a common Web portal in Unix is available for adoption to the implementation at the national control centres, KMS and SK are working in a UNIX environment while LMV is using NT. A prototype of the Web-side is available at KMS and SK, but the users have no access to it yet. LMV has started the adoption of the Web-side for NT.

The co-ordinates to be used in the RINEX header of the files with data from the Nordic networks of permanent reference stations were discussed. As discussed at the meeting on the 19th of January 2001, there is a need to do some investigations regarding the national implementations of ETRS 89. The Steering committee proposes that a common Nordic campaign, containing the stations in the Nordic networks of permanent stations and the certified EUREF stations, is carried out in order to develop a common set of ETRS co-ordinates for the Nordic networks of permanent reference stations.

The issue has also been discussed at the meeting of the NKG presidium in February 2001 and at the NKG working group meeting of Satellite Geodesy in October 2001 in Hønefoss. No decision was made at the meeting. Björn E. and Bo J. have been in contact with Marko Poutanen, the chair of the Satellite Geodesy working group and asked the group to organise such a campaign during spring 2002. Bo Madsen, Lotti Jivall (LMV), Marko Poutanen and a Norwegian representative was proposed for this task. Björn E. will inform Marko about appointed Norwegian representative as soon as possible.

From the 1st of January 2002 the co-ordinates in the RINEX header should have been the official EUREF 89 co-ordinates. The RINEX header should also have included a comment that the co-ordinates are in EUREF 89. This has not happened yet in Denmark, but will soon happen. In Norway and Sweden the right coordinates are included, but in Sweden the comment is not there yet (but it will soon be).

A2 - An Automated Computation Service

LMV has a computation service in operation on the SWEPOS web-site. Since 16th of October 2001 the user have to pay 20 % extra on the subscription fee for GPS data for post-processing purposes to achieve access to the computation service.

The performance of the service is satisfactory, but the user interface can still be improved. In order to increase the number of users LMV will organise regional information meetings.

During the last 6 months of 2001 around 300 points, used for production applications, were processed in the Automated Computation Service. Of these points about 200 were processed for the National Land Survey.

In the long run it could be desirable that also single-frequency data could be processed using this computation service.

To extend the computation service to be a Nordic service some investigations regarding the national reference systems needs to be done, see comments under sub project A1 above.

B - A Nordic Real-time Service with half-meter horizontal accuracy (95 %)

SK has installed Trimble WADGPS software. Communications between the control centres are necessary for a Nordic co-operation on a WADGPS service. The communication between the control centres was discussed in more detail under item 5 above.

The expected position accuracy of the WADGPS-service (Decipos) is 10 centimetres (1σ , horizontally) and 30 centimetres (3σ , horizontally). Tests have been performed using dual frequency Ashtech, Javad and Trimble receivers as rovers, but not Leica receivers so far. The Javad receiver did not perform as well as the others. During the last periods of high activity in the ionosphere the accuracy was decreased to 1 metre in the worst cases.

The Norwegian private company Navsys is developing a pocket VRS (Virtual Reference Station computation unit), which include a Windows CE computer, GSM modem, FM radio receiver, RS232 serial port and optionally a GPS receiver. Unfortunately the development was postponed four months. On the 1st of February 2002 SK received 10 prototype pocket VRS receivers. The first release of the pocket VRS is planned two months later and the Test operation phase begins on the 1st of April 2002.

When the communication links between the control centres are established a pilot project with a (WADGPS) "decimetre" service will be carried out in

southern Norway, southern Sweden and Denmark using the software installed at the SATREF control centre. The SATREF control centre will collect data from the control centres for SWEPOS and the Danish reference stations. SATREF will provide a computed network model to the control centres for SWEPOS and the Danish reference stations for test and evaluation.

C1A - Test of distribution channels for RTK

GSM is used as distribution channel in the network RTK projects in Sweden. An ISDN router is installed at LMV. The user fee is 1300 SKr/year plus connection time. The ordinary price for GSM data is 1.10 SKr/min during weekdays. In regional areas the fee can come down to 0,60 SKr/min. In Norway the ordinary price is 0.80 NKr/min.

A national network of transmitters for DAB (Digital Audio Broadcasting) is under establishment in Denmark. The whole country will be covered within the next year. GSM is used as distribution channel in the Trimble network RTK service and the fee is 1.15 DKr/min.

The Norwegian service MPOS (position accuracy on the meter level) is using three different distribution channels, DARC, GSM and AMDS. The last mention channel, AMDS, is not a transparent channel. CPOS (position accuracy on the centimetre level) is using GSM and DPOS (position accuracy on the decimetre level) is using both DARC and GSM.

C1B - Evaluation of available RTK algorithms

KMS has performed several tests using Trimbles network RTK service in three different areas in Denmark. Additional tests with single station RTK has also been performed. Four documents describing the tests and results are available at KMS homepage, <http://www.kms.dk/referencenet>, under RTK. In those tests there was a 43 mm vertical offset, which was not included in the results. The document will in spite of that not be rewritten. In May or June new tests will be made, and this time the offset value will be included.

An extension of the Stockholm area RTK-network has been achieved and a test project including further tests during one year, started on the 7st of

February 2002. For further information see <http://www.swepos.com>. During this year one rover of each brand (Ashtech, Javad/Topcon, Leica and Trimble) is available for the members of the project who don't own any GPS-receivers. The manufacturers supply the equipment for free. Bo J. also informed of another two RTK test projects, which will start later this year, one in the summer (in the most southern parts of Sweden) and one in the autumn (in the Gothenburg area).

A questionnaire regarding RTK positioning performance has been sent to the manufacturers of rovers used in the network RTK projects (Ashtech, Javad, Leica and Trimble). Christina Lilje has put together a list of the questions and answers and distributed it to the members of the Steering Committee.

November 27-28, 2001, Mark Richter from Trimble Terrasat gave a two-day course/training in how to handle GPS-network. The training was mainly for the operators of SWEPOS, but Mark started with an overview of the software and network RTK with VRS (Virtual Reference Stations) in general. The operators now have the guidelines they need for analysing and verifying the system. It is also clear that the Trimble software at present can't cope with the highest activity of the ionosphere.

A MSc diploma work has been written at LMV, which includes test measurements with Network-RTK. The results from the diploma work are almost the same as those from Stockholm-Mälaren part 1, with the exception that no gross errors are included.

In Sweden it has been discovered that Trimble and Javad receivers are working in another way than Leica and Ashtech receivers when they are measuring Network-RTK with virtual reference stations. The Trimble and Javad receivers are using the proprietary RTCM message 59 and make a dual-frequency solution, when they are longer than 15 kilometres from the reference station. At present Leica and Ashtech receivers don't use the RTCM message 59 and are using a L1-frequency solution, because of the short distance to the virtual reference station.

LMV has not done any more tests with the Calgary network RTK software since the last Meeting.

**ITEM 7: DRAFT OF THE AGREEMENT ON EXCHANGE OF DATA
(BOTH REAL TIME AND POST-PROCESSING) BETWEEN THE NORDIC
COUNTRIES**

- PRICING ISSUES

The Steering committee proposes that data (both post-processing and real time) will be exchanged free of charge between the Nordic countries. To avoid competition each National Mapping Authority will only distribute data for use within the nation and this condition shall clearly be stated in the agreement with the users. On the other hand each NMA are free to charge the national use of Nordic data according to the national price list.

Reidun Khalayli, SK, presented a new proposal for an agreement, in English, for exchange of data between the Nordic countries without any costs. This proposal was revised by the Steering Committee and the changes were printed into the document directly by Reidun. In the end a draft of the proposal was obtained, which shall be analysed by the Mapping Authorities (see Appendix C).

If one country shall use the data from another country for a new service or application, it shall be announced 6 Months before the new service or application will be ready for use. This agreement shall be valid from the date when it is signed. The agreement should be valid one year and extended one year at a time. The period of notice should be six months.

**ITEM 8: DISTRIBUTION OF INFORMATION FROM THE MEETINGS
OF THE STEERING COMMITTEE**

Christina Lilje has published a summary of the minutes from the last meeting of the steering committee at the NGK's home page. The minutes from the coming meetings will also be available there. And when they are available there, a notification and a link to the web site will be sent to the members of the steering committee, who can inform the employees at the geodetic divisions of the Mapping Authorities. A document describing the project in general and the sub project specifically is also available at the NGK's home page.

ITEM 9. ONGOING ACTIVITIES

Will there be any changes of the sub-projects now when we don't get any financial support from "Nordisk Industrifond"? In sub-project A2 e.g. it is proposed that we shall wait for external financing. There will probably not become any common service without such financing, though can we implement things that the other parties has finished/ done and exchange data.

Anyway, for the time being we continue with the same division into sub-project.

ITEM 10. FUTURE WORK

On the 12th of March there will be a seminar in Gävle about Network-RTK. Manufacturers of GPS receivers and providers of Network-RTK softwares will participate in the seminar.

ITEM 12. NEXT MEETING AND CLOSING

The next meeting of the Steering Committee will take place at KMS in Copenhagen on June 13, 11.00 – June 14, 13.00, 2002. Björn thanked all the participants for their contribution to a fruitful meeting.

Appendix A	Nordisk Industrifond
Appendix B	Samnordiske Projecter
Appendix C	Agreement on exchange of and rights to GNSS real time data and data for post processing.