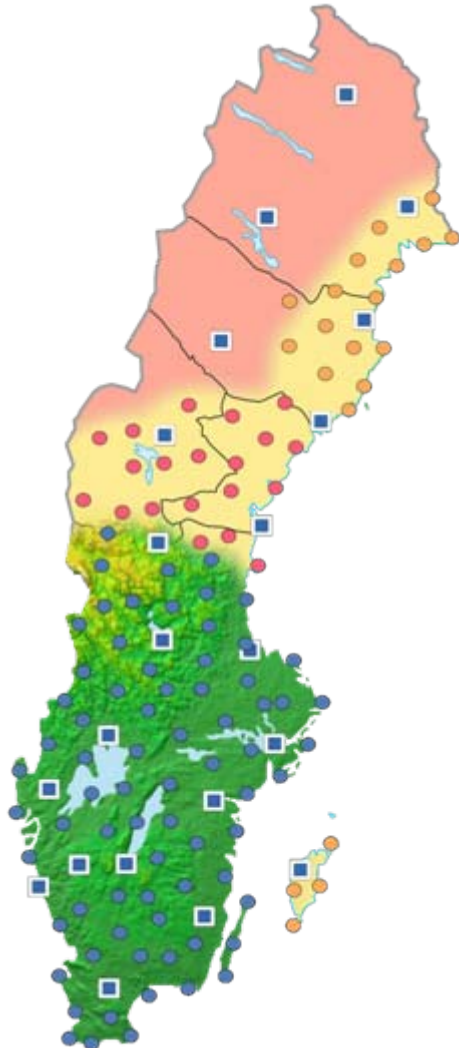




SWEPOS™ Services

– status, applications and experiences



Lantmäteriet

National Land Survey of
Sweden

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L A N T M Ä T E R I E T





How it started

1991

SWEPOS was established in collaboration between

1992

The National Land Survey of Sweden

1995

Onsala Space Observatory

Swedish National Research and Testing

1995-99

Institute

2000-





How it started

1991

1992

SWEPOS was designed and financed by:

1994

The Swedish National Rail Administration

The Swedish Armed Forces

1995

The National Land Survey of Sweden

The Swedish Civil Aviation Administration

1995-99

The Swedish State Railways

The Swedish Maritime Administration

The Swedish Telecom

The Swedish National Road Administration

2000-

L A N T M Ä T E R I E T





Today

1991

National Land Survey is responsible for the operation and development

1992

The purpose of SWEPOS is:

1994

L1 and L2 raw data for post-processing
DGPS and RTK corrections

1995-99

High-precision control points
Scientific studies of crustal motion

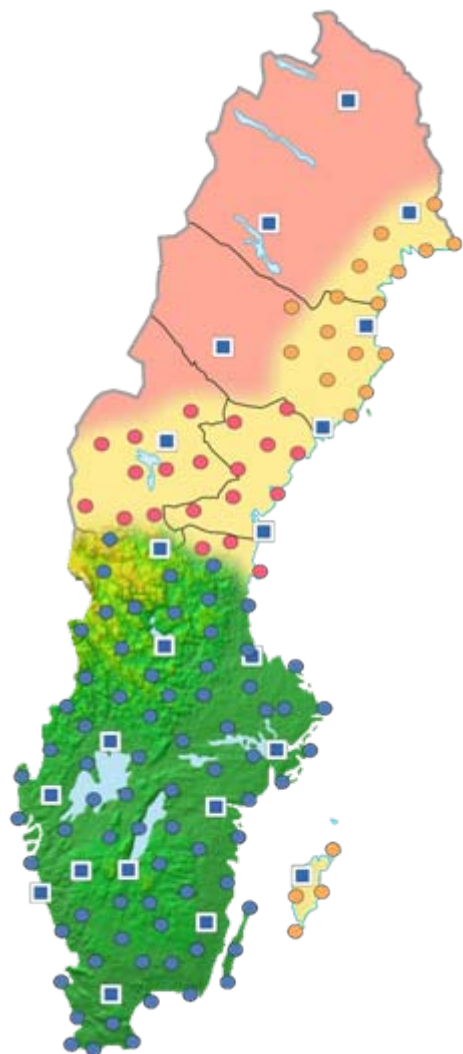
2000-

Monitor the integrity of the GPS system





The SWEPOS™ Network



21 complete stations



84 simplified stations

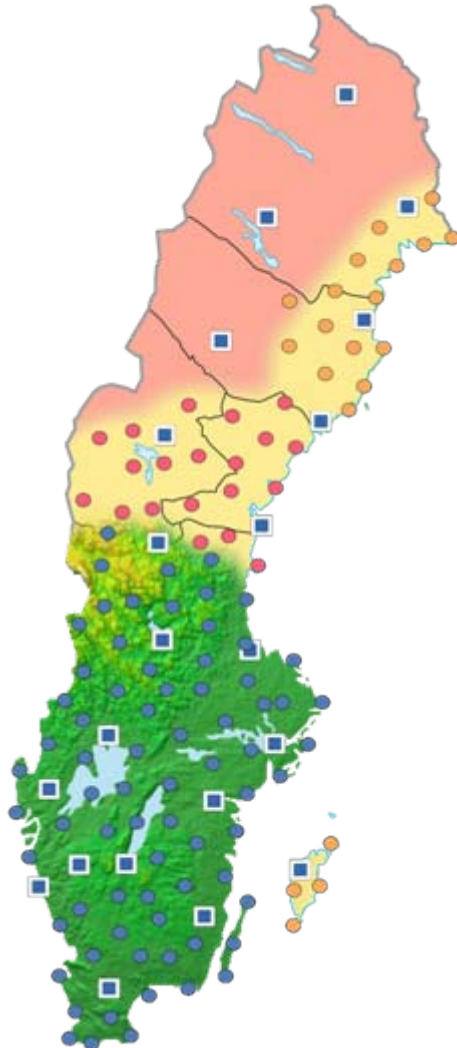
5 IGS- and 7 EPN-stations ■

LANTMÄTERIET





SWEPOS Real-time Services



EPOS™

DGPS-service operated by Cartesia

1 meter accuracy

RDS-channel on the FM-radio

SWEPOS Network-RTK service (2004-01-01)

Centimeter accuracy

Cellular phone, GSM or GPRS

SWEPOS Network-DGPS service (2006-04-01)

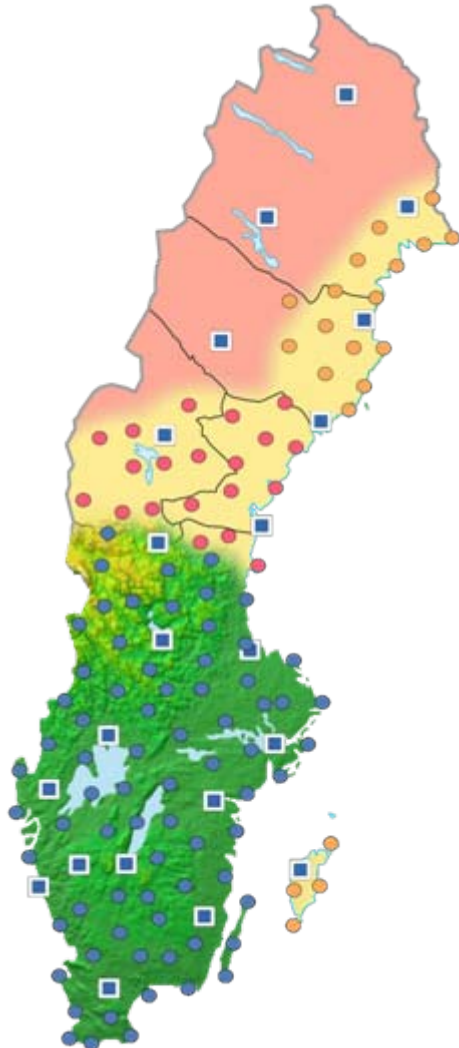
0,3 meter accuracy

Cellular phone, GSM or GPRS

LANTMÄTERIET



Longterm Plan



Proposal on a National Network

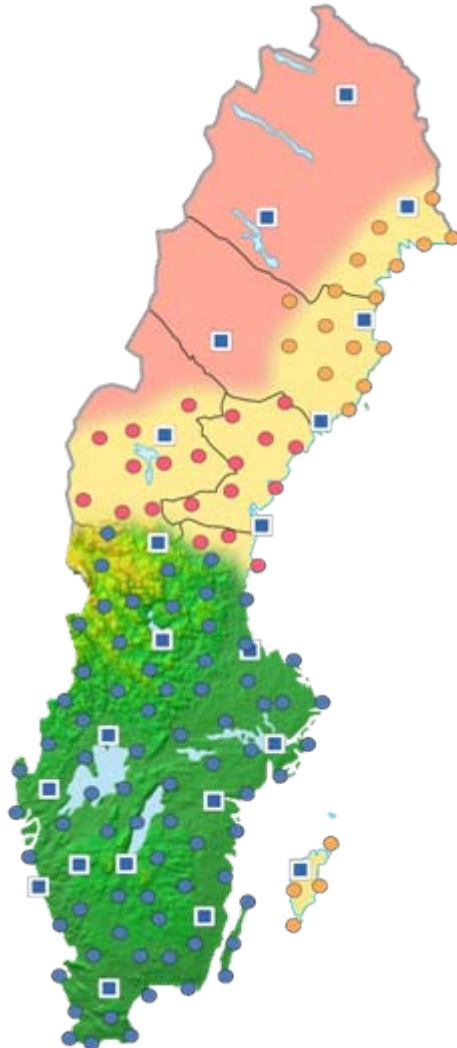
RTK service of approx. 140 stations

The investment is covered by governmental funds and the operation costs mainly by user fees

The plan has been approved by the Director General



Introduction of Network-RTK in Sweden



Pre study projects 1999-2001

Prototype Production Projects, 2002-2003

National Positioning Service +
Establishment Projects, 1 Jan 2004

DESIGN:

- Densification of the existing SWEPOS infrastructure
- Collaboration projects between National Land Survey and GPS-users
- Financial support from County administrations and EU regional program

L A N T M Ä T E R I E T



Establishment projects



The establishment-projects gets the users in the area started with GPS, when the project is finished most of the users sign up for a subscription.

The project contain;

- Basic GPS-training and education
- Lending a GPS-rover for a part of the period
- Userseminars at which the users can share experiences
- Transformation parameters from SWEREF99 to local subnets are provided by the National land Survey





Establishment projects

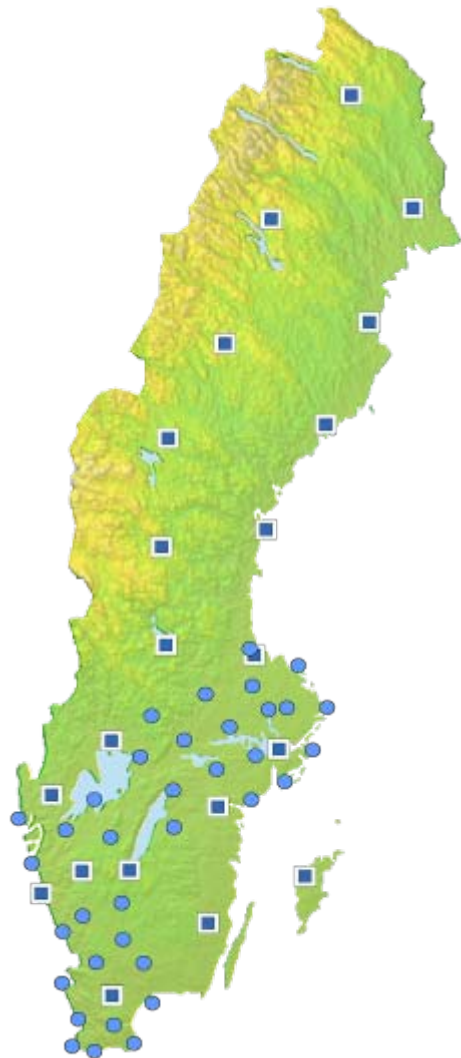


- Complete SWEPOS stations 1992 – 1994

LANTMÄTERIET

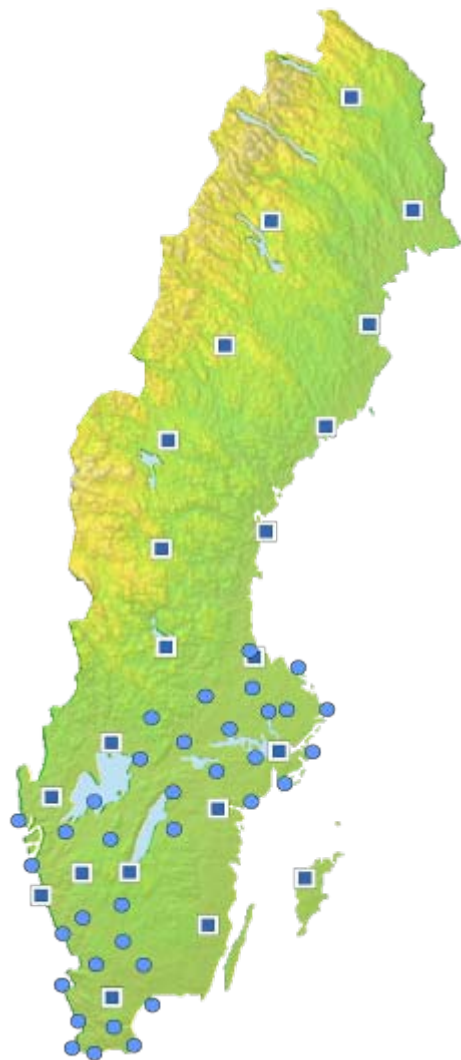


Establishment projects



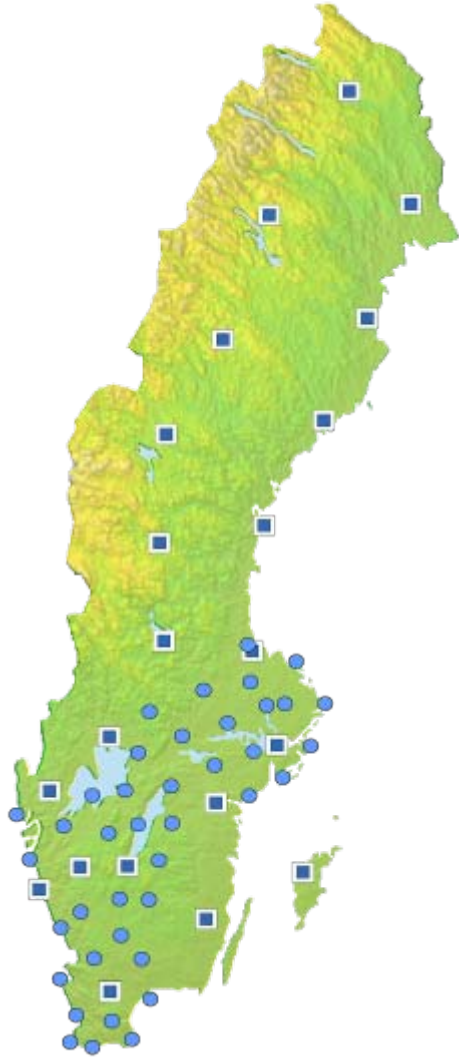
- Complete SWEPOS stations 1992 – 1994
- Sthlm-Mäl, SKAN-RTK and Väst-RTK 2002

Establishment projects



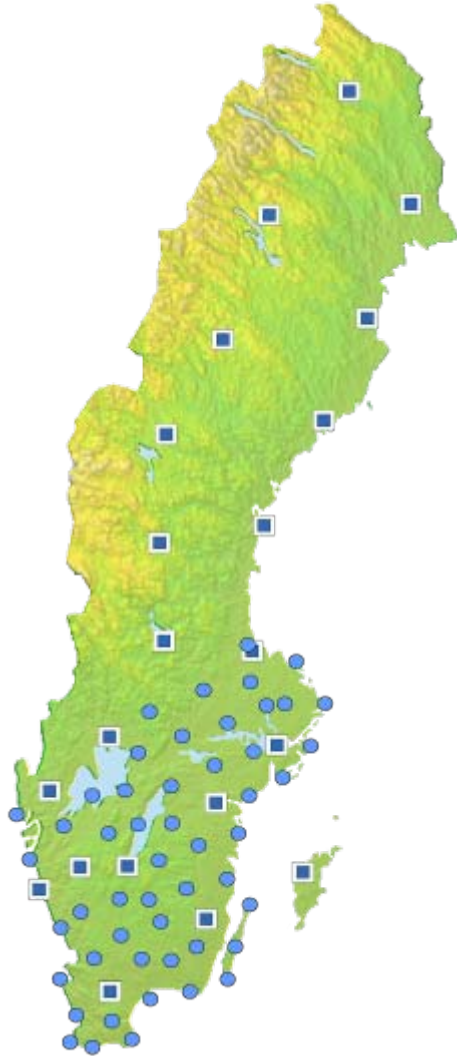
- Complete SWEPOS stations 1992 – 1994
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- **Network-RTK –service 2004-01-01 –**

Establishment projects



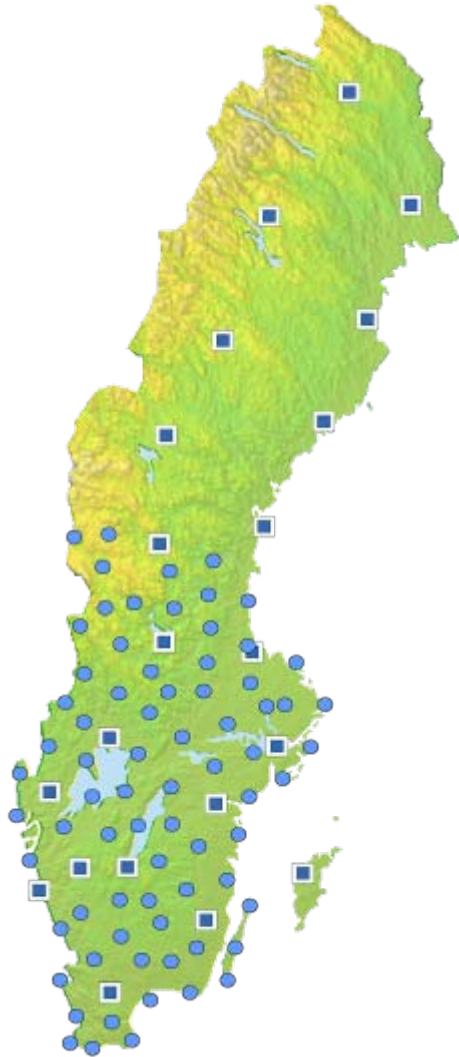
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- **Network-RTK –service 2004-01-01 –**
- Mitt-Ost-RTK early 2004

Establishment projects



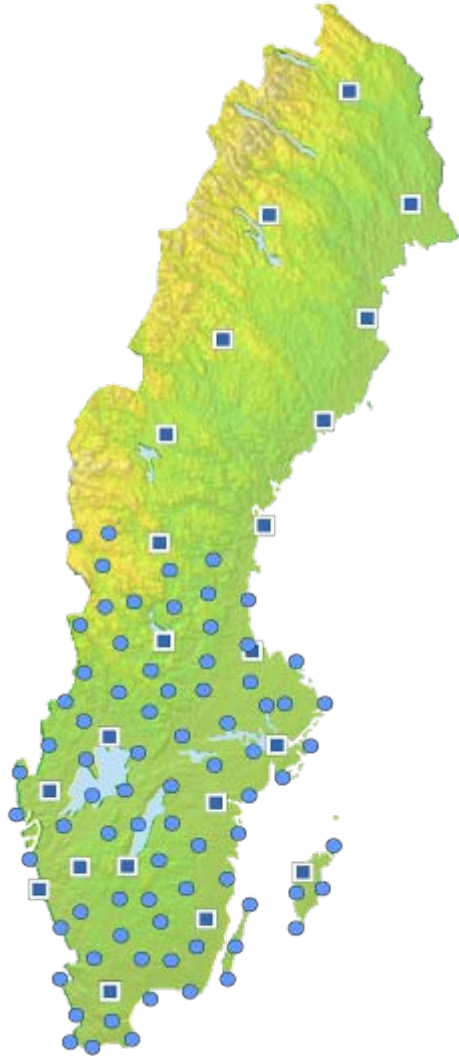
- Complete SWEPOS stations 1992 – 1994
- Sthlm-Mäl, SKAN-RTK and Väst-RTK 2002
- **Network-RTK –service 2004-01-01 –**
- Mitt-Ost-RTK early 2004
- Ost-RTK late 2004

Establishment projects



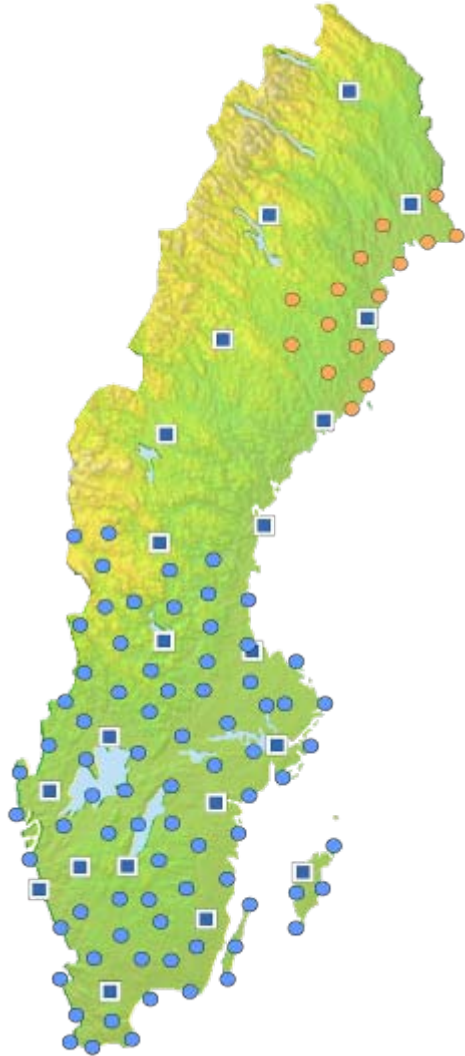
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- Position-Mitt 2005

Establishment projects



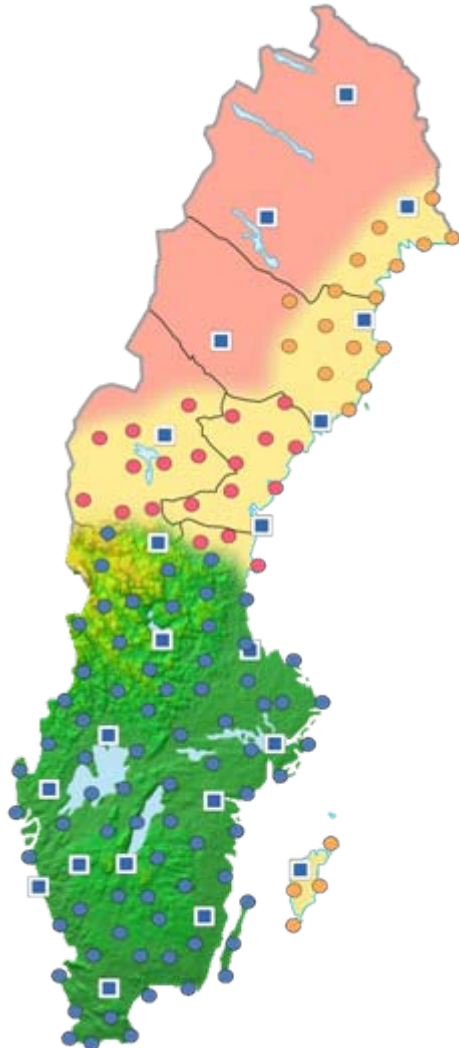
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- Gute-RTK May the 1st 2006

Establishment projects



- Complete SWEPOS stations 1992 – 1994
- Sthlm-Mäl, SKAN-RTK and Väst-RTK 2002
- **Network-RTK –service 2004-01-01 –**
- Mitt-Ost-RTK early 2004
- Ost-RTK late 2004
- Position-Mitt 2005
- Gute-RTK May the 1st 2006
- Nordost July the 1st 2006

1 January 2004



Network-RTK service

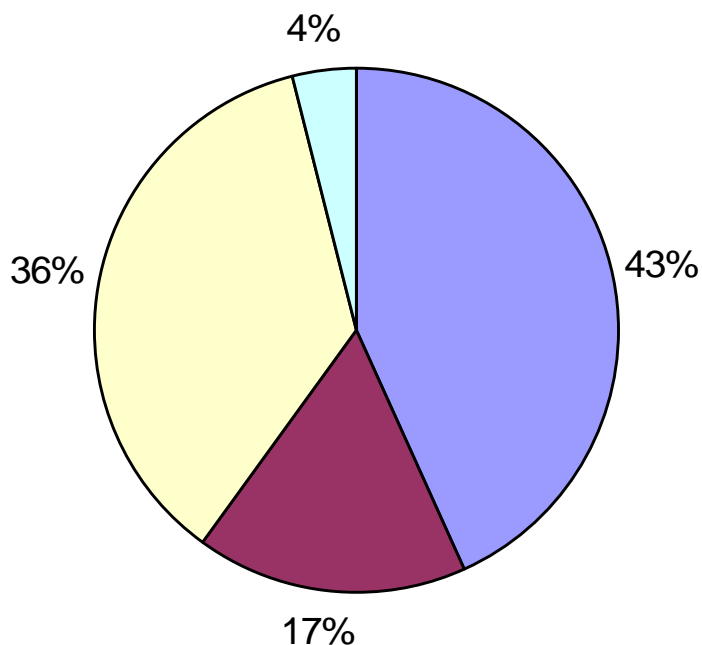
User fees for the operation costs:
One-time fee: 550 €/connection

A. Unlimited data amount:
1600 €/con./year + GSM

B. Down-loaded data:
500 €/con./year + 0,6 €/min
+GSM

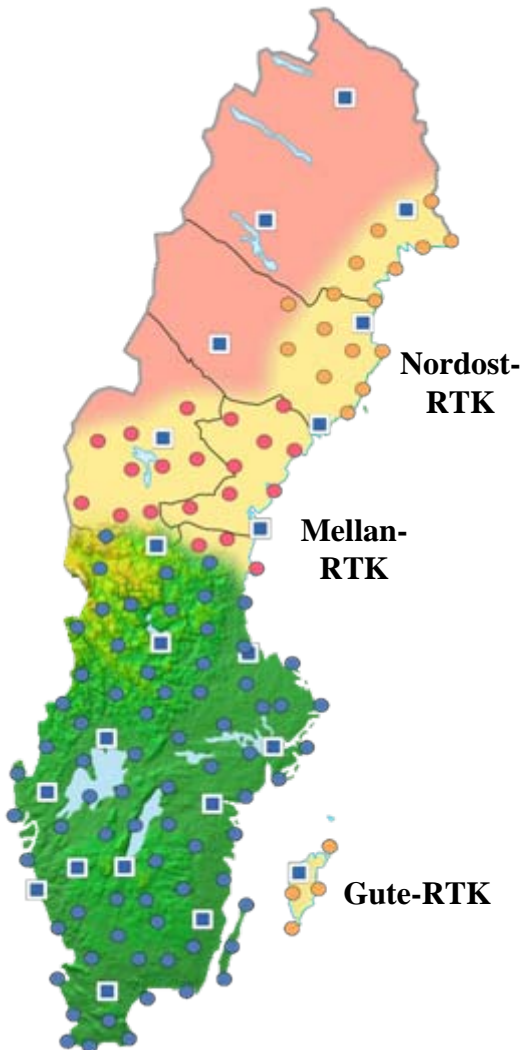
Who are the users?

450 subscriptions on May 2006



- Local Authorities
- Land Survey
- Consultancy companies
- Governmental agencies

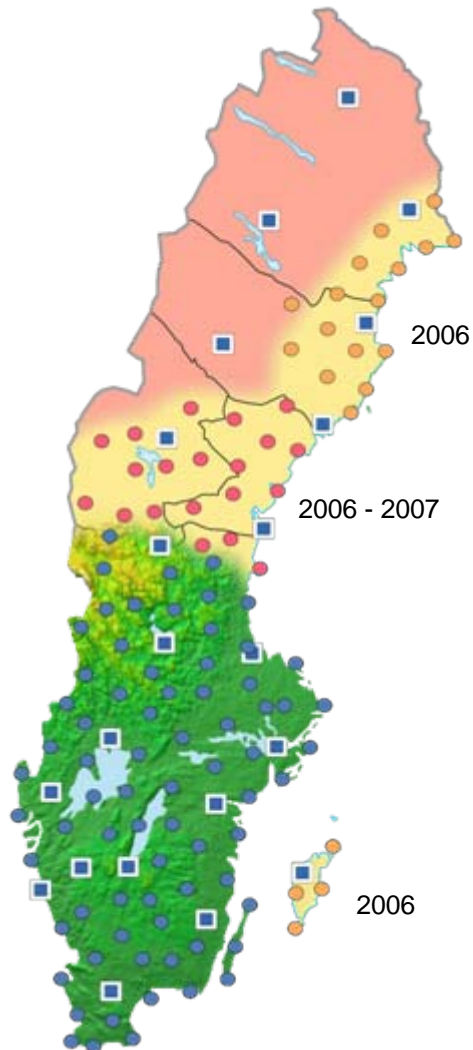
Establishment projects



- Complete SWEPOS-stations
- Simplified SWEPOS-stations
- New stations "Gute-RTK" operational on May the 1st, and "Nordost-RTK" operational on July the 1st, 2006
- Planned stations for the "Mellan-RTK" area 2006-2007

Today no planned stations or coverage for network-RTK, only SWEPOS Calculation Service.

User experiences

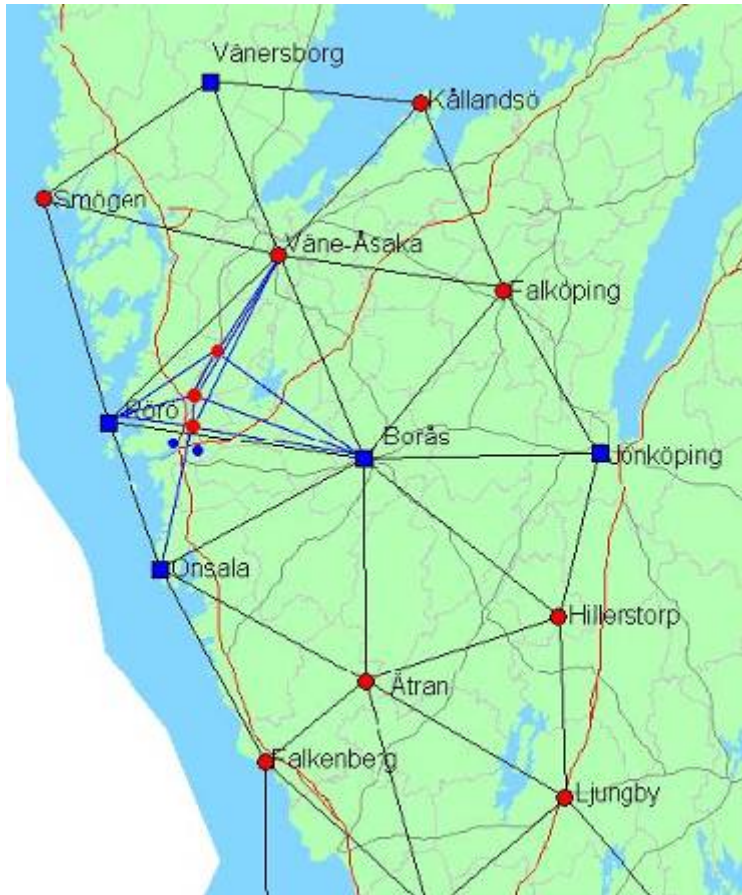


Experiences from the users

- Network-RTK is efficient and easy to use
- The GPS maturity of the users is varying
- A high availability of the Network-RTK service is required
- The coverage of suitable distribution channels is a bottle neck in some areas
- Standards for Data format and GPS-receivers are welcome



Projectadapted Network-RTK Features



- Established and operated by the National Land Survey, SWEPOS for the National Road administration
- Network-RTK service
Corrections distributed via radiomodems
- Automatic computation
Service for static measurements

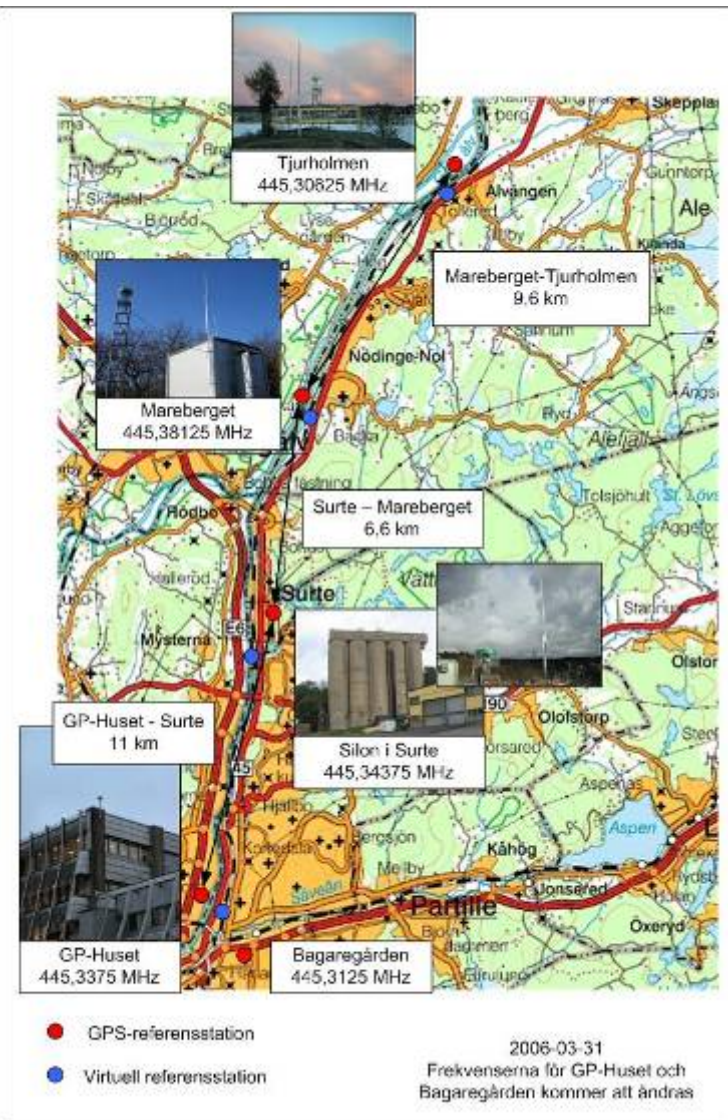
L A N T M Ä T E R I E T



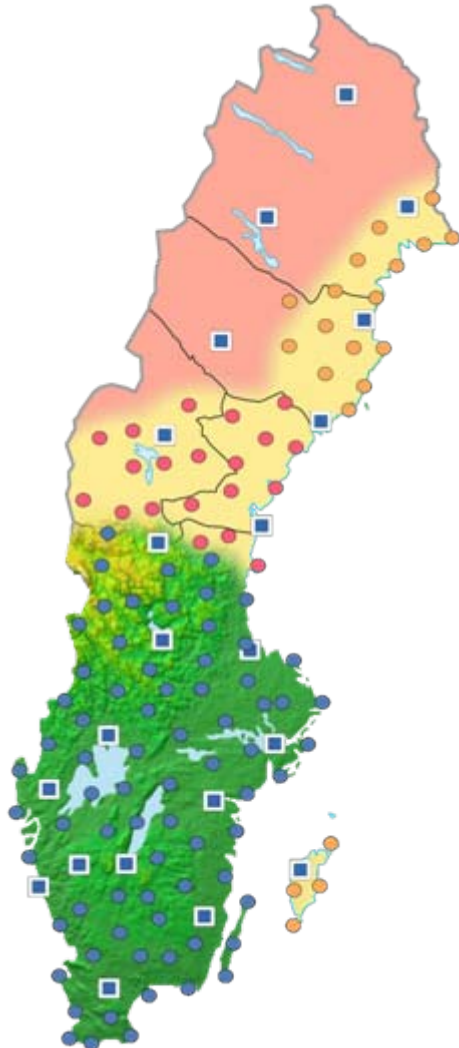
Projectadapted Network-RTK

Purpose

- One realtime positioning system for the workarea
- Monitoring of transmitted corrections and deformations in the subnet of referencestations
- Easier to make quality checks for the National Road adm.
- Promotes standardisation in GPS-measurements and machine-guidance



Conclusions



A multi-purpose network of permanent stations is beneficial both for the users and for the providers of national infrastructure for positioning and non-safety-of-life navigation.

Further developments in standardisation, reliability and precision are desirable

Thank you for your
attention!