

SMS 112 in Sweden



SMS 112 in Sweden

Table of contents

- Background 4
 - Results 4
- General description of the service 5
 - SMS function..... 5
 - Telephone..... 5
 - Cooperation with other relay services 6
 - Operator cooperation: telecom operator and Eniro 6
 - Access 6
 - Positioning..... 6
 - Priority in the network..... 7
 - General description of how an SMS is sent in the telecom network..... 7
 - The 112 number 8
- Service quality 8
 - Competence at the alarm operator..... 8
 - Quality targets..... 8
 - Handling methods, including handling lost calls..... 9
 - Lost call..... 9
 - Turnaround time 10
- Security and secrecy 10
 - Registration..... 10
 - Secrecy and non-disclosure 10
- Information 11
 - Formulation and channels of information 11
 - Customer service 11
- Follow up and statistics 11
 - Users and cases 11
 - Dialogue with user representatives 11

Operation and maintenance 12

- Operation and maintenance..... 12
- Monitoring the system 12

Technical description 12

- System set up 12
- Network description..... 13
- Redundancy..... 14

Comments from users about the service 14

- Swedish National Association of the Deaf..... 14

Statistics on users 15

Background

In Sweden, the deaf and those with hearing or speech impediments can use a text telephone. Previously however, persons with such handicaps have not had the opportunity to use a mobile phone in an emergency situation. That is the background to the research project that SOS Alarm and the Swedish Post and Telecom Agency have been running to enable the deaf and those with hearing or speech impediments to make emergency calls to 112 with the aid of SMS.

The aim of the project has been to help increase security for this group. During the introductory test period, special telephone numbers have been used, but during the project period, the number 112 has been implemented with SMS as carrier.

The project has been implemented in several stages so as to identify what technical measures are needed to increase the reliability of the service. Tests with simulated cases have been performed by SOS operators and representatives of the user group.

When the project began in 2006, the first step was to create a customer database and a website for registration of users of the service. In parallel with this, the technical platform needed to handle the SMS 112 service in action was developed and quality assured. Incoming cases have been handled primarily by the SOS Centre in Östersund and secondarily by the SOS Centre in Sundsvall.

Results

Experiences with the SMS 112 service have been positive. During the period December 2006 – September 2008, 60 genuine emergency calls have been received with good results. The number of emergency calls has been fewer than expected however, probably because the number of registered users (1 329) has been considerably fewer than the estimated 20 000. Turnaround time per call has averaged 14 minutes, which is somewhat more than was indicated during simulation exercises before the project started.

Even though the SMS 112 service has suffered from some shortcomings, such as somewhat longer turnaround times and lower reliability than estimated, experience to date indicates that SMS can be used as a carrier of emergency calls to 112 from the intended user group.

The user group has pointed out that the SMS 112 service is an important security factor for those who are unable to raise the alarm with a normal telephone. Continuation is therefore considered necessary, together with increased information efforts in order to reach potential users. There is also a strong desire to make the present registration procedure unnecessary in some way.

Some adjustments can still be made to improve the service. They are:

- finding a more exact position of an SMS 112 call, such as whether it can be positioned automatically in the same way as normal mobile phone calls to 112.
- adding the facility to send out important general messages, which is possible since all users are registered. Such a measure might attract more people to register for the service.

- testing the possibility of adding a daytime number for use by users in situations where help is needed that does not relate to the 112 emergency number but could be perceived by the user as an emergency. This issue could be relevant when a crisis information number for the general public is discussed.
- investigating more closely how foreign subscriptions could be handled, such as whether there is any possibility of registering as an SMS 112 user during a visit to Sweden .

During the research period, the project has met with great interest both in Sweden and from colleagues abroad. A need has been found to show our experiences to colleagues in other countries. The following account describes how the service will be formulated in the immediate future.

General description of the service

SMS function

The SMS 112 function is intended to provide a means of communicating with SOS Alarm for persons who are unable to use 112 as a voice call because of a communication handicap; so-called users.

The solution is that the user is able to send a normal SMS message to the 112 number and in this way receive help from the SOS operator in the same way as with a normal 112 call.

In technical terms, an SMS 112 from the mobile operator's network is connected to an SMS server managed by the Eniro company. From here, it is connected to special workstations at the SOS centres in Sundsvall or Östersund. Only these two SOS centres can handle SMS messages to 112. They then connect the call to the nearest SOS centre to the incident. Internal monitoring is established between the SOS centre that first received the call and the one handling the emergency, so that the first can help the other with interpretation.

After a 112 SMS has been received, it is handled according to the same routines as a normal 112 call. There are currently 18 SOS centres in Sweden¹.

Telephone

It should make no difference what mobile phone the user sends an SMS to the service from. It is a normal SMS that is sent.

SOS Alarm does not test mobile phones to check whether these work for the SMS 112 service.

SMS has limitations. The most important things to point out about the service are as follows.

- You cannot send an SMS if there is no valid SIM card installed in the telephone.
- You cannot send an SMS without contact with your own network or from a network without a roaming agreement.
- The mobile phone subscription must be valid - a Pay As You Go (prepaid) phone with available credit for example.
 - So, unlike voice calls to 112 from a mobile phone, you cannot use the service without a SIM card or credit on a Pay As You Go phone.
- The telephone may have problems receiving an SMS if its memory is full.

¹ SOS centres: <http://www.sosalarm.se/sv/Kontakt/SOS-centraler1/SOS-centraler/>

Cooperation with other relay services

When handling SMS 112, there is no cooperation with any other relay service.

Operator cooperation: telecom operator and Eniro

There is no special cooperation between the mobile phone operator and Eniro for this service. From the mobile phone operator's point of view, it is like any other SMS service.

Access

A user must register in order to be able to use the SMS 112 service. To register, the user goes to the SOS Alarm website (www.sosalarm.se) and enters the following mandatory information.

- First and last name
- Personal ID number
- Street name and number
- Postal code
- Postal address
- E-mail address

Once registration has been done on the SOS Alarm website, it is sent on to Eniro. The user's information is then entered manually onto the SMS 112 system at Eniro. Once this manual entry has been completed, the user receives an acknowledgement by SMS that the service is now available.

Quite often when users receive this acknowledgement that the service is available, they send an SMS to 112 to test the system. This places an unnecessary load on the SOS operator, because the test SMS will arrive at the SOS centre but is not a real emergency.

If a person who is not a registered user of the SMS 112 service sends an SMS, this is filtered out and does not reach the SOS operator. This filtering out process does not send any response to the sender of the message. The reason why the sender receives no acknowledgement is that this might tend to encourage sending more SMS messages to 112 and causing an unnecessary load on the system.

Positioning

There is currently no positioning of users who have sent SMS messages to 112.

It should be possible to see the position of the terminal that forwarded the SMS to 112 since the terminal's telephone number, MSISDN is known to SOS alarm.

The positioning service currently used for mobile phones that ring 112 is based on SOS Alarm receiving the subscriber's MSISDN. SOS Alarm then sends a query by sending the received telephone number to the network the call came from. The response that comes back is the coverage area of the cell in question.

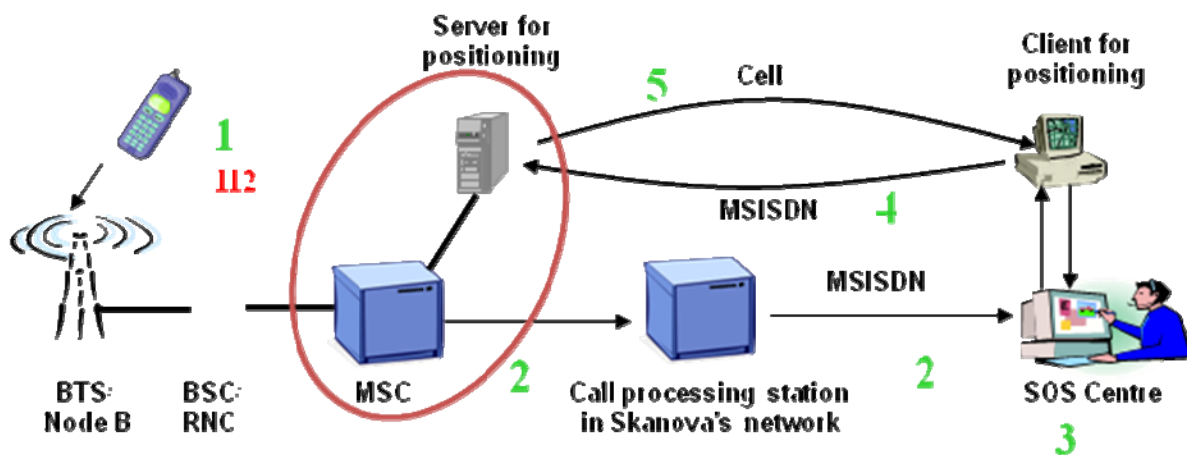


Figure 1: Present day positioning of mobile phones for 112

It should be noted that the mobile phone operators do not currently check whether the subscriber actually called 112, i.e. it is SOS Alarm that ensures that only 112 calls are positioned.

If it should be desirable to also introduce positioning of users of SMS 112, certain changes need to be made in the system and procedures that SOS Alarm currently uses for positioning mobile phones.

Priority in the network

SMS messages to 112 have no priority over other SMS messages in the network.

General description of how an SMS is sent in the telecom network

When an SMS is sent it is transferred from the terminal (mobile phone or application) to an SMS centre in the relevant operator's network. Then the SMS centre must find the recipient. This is done by a procedure called Send Routing Information, by asking the receiving terminal's home network where the subscriber is. With the aid of the direction information then received, the SMS can be sent to the receiving terminal.

Where an SMS is to be sent to an application, the SMS is sent the "back way" from the SMS centre via IP to the receiving application. Since these applications (e.g. SMS voting, SMS tickets) do not move around, the SMS centre can have a more static routing and in this way reach the address more quickly.

If a response SMS is to be sent from a mobile phone to another, the procedure is repeated as in part 1.

If it is an SMS from an application of the SMS 112 or SMS ticket type, the procedure as in part 1 must be repeated when it reaches the relevant SMS centre. The subscriber who sent the first SMS may have moved, so the SMS centre repeats the procedure to find the subscriber.

There are a number of factors that affect how quickly an SMS gets through. Pressure on the SMS centre can lead to delays, as can be illustrated by SMS traffic on New Year's Eve. Another factor that affects applications of the SMS 112 or SMS ticket type is the performance of the relevant server.

The 112 number

The 112 number that is used for normal 112 voice calls belongs to the Swedish numbering scheme for telephony and is reserved for the 112 service.

The 112 number as an SMS address is an internal network service number or short code in the same way as e.g. 72XXX, 118118 etc. What happens with all short codes for SMS traffic is that the mobile operators configure them in their systems at the request of the service provider and direct them to the service provider that handles the service, e.g. Eniro. All incoming SMS messages are sent by the mobile operator to the service provider that has ordered the number.

So for example if SOS Alarm wants to start an SMS service that is to be handled by Eniro via IPX, Eniro orders IPX to set up the short code (112 in this case) and IPX orders this from the mobile operators.

When a Telia subscriber sends an SMS to SOS Alarm on 112, Telia will have configured it so that the SMS is delivered to IPX, and IPX has configured it so that it is sent on to Eniro, and the reverse for SMS messages in the other direction.

It should be noted that the SMS 112 service is specific to the Swedish mobile network. This means that the service does not work abroad.

Because of the special position the number 112 has it is not likely that mobile operators in Europe would use the number for other internal network services.

Service quality

Competence at the alarm operator

At the SOS-Y (Sundsvall) and SOS-Z (Östersund) SOS Centres, all SOS operators handle the SMS 112 service if they have undergone SOS Alarm's care training and received a review of the SMS 112 system.

The review of the SMS 112 system includes the following:

- The operator learns how the client for SMS 112 works.
- How a case in the SOS case handling system Zenit should be created if an alarm comes via SMS 112.
- The manual routines that exist, such as the daily SMS test of the SMS 112 system.
- What action should be taken if the system appears not to be working.

All 112 calls that come in via the conveyance services for text and image telephony are handled at the SOS-Y and SOS-Z centres. This gives the SOS operators expertise in being able to understand the language usage of the group for which the SMS 112 service is intended.

In order to maintain expertise at the two SOS centres, they take it in turns to be the prime receiver of the SMS 112 service at weekly intervals.

Quality targets

At present the service does not have any expressed quality targets as a requirement. The turnaround time is however constantly monitored.

Reporting of service quality of SMS 112 in accordance with PTSFS 2007:1 "PTS general advice about information and service quality" is not currently done.

Handling methods, including handling lost calls

Handling routine for a 112 call via SMS

When an SMS comes into the SMS 112 system, it is answered by an SOS operator via the SMS 112 system's client. The SOS operator commences a dialogue with the person seeking help via the SMS 112 system's client, to find out what has happened and where.

At the same time, the SOS operator creates a case in the SOS Alarm case handling system Zenit and enters all the information that comes in into the case: name of the person seeking help, telephone number, location etc.

If the person should require an ambulance, police, rescue service or similar assistance, the SOS operator rings the SOS operator who controls ambulance/rescue services at SOS Alarm to send a unit to the person requiring help.

When this contact occurs, the receiving SOS operator sends the case in Zenit to the SOS operator who handles the call out and direction of ambulance/rescue service to the person needing help. The receiving SOS operator continues internal monitoring.

If the SOS operator handling directions needs more information from the person seeking help, this communication occurs via the SMS operator who received the SMS and is handling the SMS 112 client.

When the caller has received the assistance needed, the case is closed in Zenit by the SOS operator who has been handling direction.

SMS 112 and normal 112 calls differ in the following ways:

Normal 112 calls are steered through the network to the "right" SOS Centre, while SMS 112 calls always come to the SOS Centre in Sundsvall or Östersund, since these are the only ones that handle SMS. This means that the SOS Centre in Sundsvall or Östersund has to contact the "right" SOS Centre in order to send out an ambulance or rescue resources. It is technically possible for the SOS Centres in Sundsvall and Östersund to handle ambulances in other parts of the country, but as long as there is no problem with the Zenit system, the SOS Centre that handles ambulances in the county in question covers all direction of efforts.

If any other kind of resource is needed by the caller, for example the police, the SOS operator who received the SMS and is handling the SMS 112 client will contact the resource and maintain a dialogue with the caller via SMS and with the resource via telephone.

Lost call

No connection is established between the person needing help and SOS Alarm when SMS 112 is used; All SMS messages that are sent between SOS Alarm and the caller are individual SMS messages. The only way in which an SOS operator can notice that a "call" has been broken off is if no further SMS messages come in.

If the SMS 112 system should stop working during an ongoing SMS exchange, the SMS operator uses a spare mobile phone that is kept at the workplace and attempts to contact the caller by SMS and by ringing.

If the SOS operator receives no answer to these attempts at contact, he or she then uses the information that SOS has received from the caller up to the point that contact was lost.

The following instructions for users appear on SOS Alarm's website: "In the event of an emergency, those who use the service can send an SMS to the number 112 with as much information about the incident as possible. The first message should state briefly what has happened and if possible where help is needed. The SOS operator will reply with an SMS with any additional questions needed to obtain sufficient information to be able to send the right help to the right place."

This is so that SOS Alarm will receive the information needed to be able to send help if needed right from the first SMS.

If the SMS does not state where help is needed, the operator will refer to the information given by the user when registering.

The same applies if the caller does not reply to the SMS that the operator sends in response. In such a case, the SOS operator attempts to contact the caller via the alternative mobile phone to be sure that it is not a problem with the SMS 112 system that is preventing the caller from answering.

If the SOS Centre responsible for the SMS 112 system should have serious system problems that cause Zenit to stop working, the SMS 112 service is moved to the other SOS Centre.

Turnaround time

According to estimates from the SOS Centres in Sundsvall and Östersund, turnaround time varies a good deal, from a couple of minutes to ten minutes or much more.

The cases that take longest are often those where the police are called in, where there is a difficult address or a complicated case. What can also take time is where the caller should really have contacted the health care advice service.

Security and secrecy

Registration

An incoming SMS to 112 is registered as a normal SMS case at the SOS Centre that receives the message. This means that time, date, location, type of case and information about the accident and those involved are recorded.

Secrecy and non-disclosure

All SOS personnel are under an obligation of non-disclosure.

The personnel at Eniro who handle the user's information are also subject to a non-disclosure agreement between SOS and Eniro.

Information

Formulation and channels of information

Information about how the service works may be found on the websites of SOS Alarm and PTS. SMS 112 is a fixed duration development project that has a reference group consisting of interested parties from user organisations.

Customer service

There is no specific customer service arrangement for users who have questions regarding SMS 112.

Operation and maintenance of the system is handled by Eniro. Fault reports for all hardware and software should be sent to Eniro's central IT support.

Daytime 08 – 55 33 13 00

Other times +47 40 01 31 23

SOS Alarm is responsible for the interface for input of new users. Fault reports regarding this should be sent to SOS Support.

Follow up and statistics

Users and cases

Total users registered 2010

January	February	March	April	May	June	July	August	September
1647	1655	1669	1681	1689	1698	1705	1722	1738

For data by county, see section Statistics on users

In SOS Alarm's case handling system Zenit there are 23 cases that indicate that the call was received via SMS 112 during 2010.

These 23 cases can be divided by type as follows:

Number	Case
8	Police
3	Rescue
4	Care
8	Other - no action

Dialogue with user representatives

SOS Alarm has a users' council of user representatives to which PTS is invited.

Operation and maintenance

Operation and maintenance

SOS Alarm has engaged Eniro to handle the service and Eniro uses its subsidiary Iteration to operate the system.

Monitoring the system

Twice a day, the SOS operator at the SOS Centre that is responsible for the service performs a manual test of the system by sending an SMS with the test mobile phone kept at the centre. The purpose of this test is to verify that the entire chain is functioning and that there are no problems in receiving SMS messages.

The connections used for the system between Eniro and SOS Alarm are monitored by Eniro so that any connection problems can be detected.

The SMS 112 server hardware is monitored for hardware faults. If a fault should occur, notification is sent to a technician on duty, who starts faultfinding.

The SMS 112 server processors are also monitored and set to automatic restart if they should stop. If this restart of software is unsuccessful, notification is sent to a technician on duty, who starts faultfinding.

Technical description

System set up

The system is based on a server/client solution, in which the server application listens to incoming SMS messages that are sent to the 112 number and the client computers (normal PCs) offer an interface for sending and responding to SMS messages.

The server and clients are in different physical locations; the server is at Eniro in Stockholm and the clients are located in the SOS Centres in Sundsvall and Östersund.

The server software checks whether the sender of an SMS is a registered user and if so sends the message to a client.

The client lights a signal lamp when it receives an incoming message, so as to alert the SOS operator that a new message has come in via SMS 112. This notification is necessary because the SMS client is connected to a split screen in front of the SOS operator.

This split screen solution is necessary because there is no room for an additional screen at the SOS operator's workplace.

When the SOS operator answers or sends a new message in the SMS 112 client, the message is sent from the client to the server, which converts the message into an SMS that is sent out via the mobile network to the person requiring help.

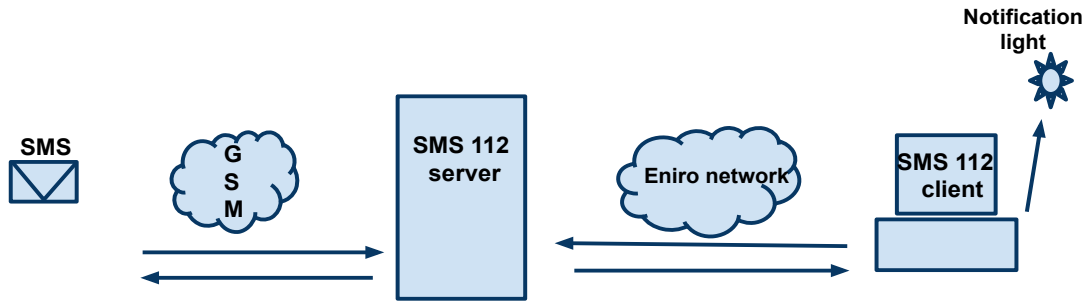


Figure 2: System overview

Network description

The two SMS 112 clients at the SOS-Y and SOS-Z Centres are connected to a dedicated network at the SOS Centre that is only used for these clients and has no contact with other systems at SOS Alarm.

The local network is connected to the local Eniro office in Östersund and Sundsvall via a Telia connection, SOS Östersund -> Eniro Östersund, SOS Sundsvall -> Eniro Sundsvall.

This connection means that the SMS 112 client can communicate with the SMS 112 server that is located in Eniro's server hall in Fredhäll through the SMS 112 client being connected to Eniro's network.

The SMS 112 communicates out to the mobile network via the internet and IPX.

IPX (Ericsson Internet Payment Exchange, <http://www.ericsson.com/ourportfolio/>) is an SMS aggregator that offers an interface and sends and receives SMS messages. By using IPX, you have one interface with one other party instead of an interface with each individual telecom operator.

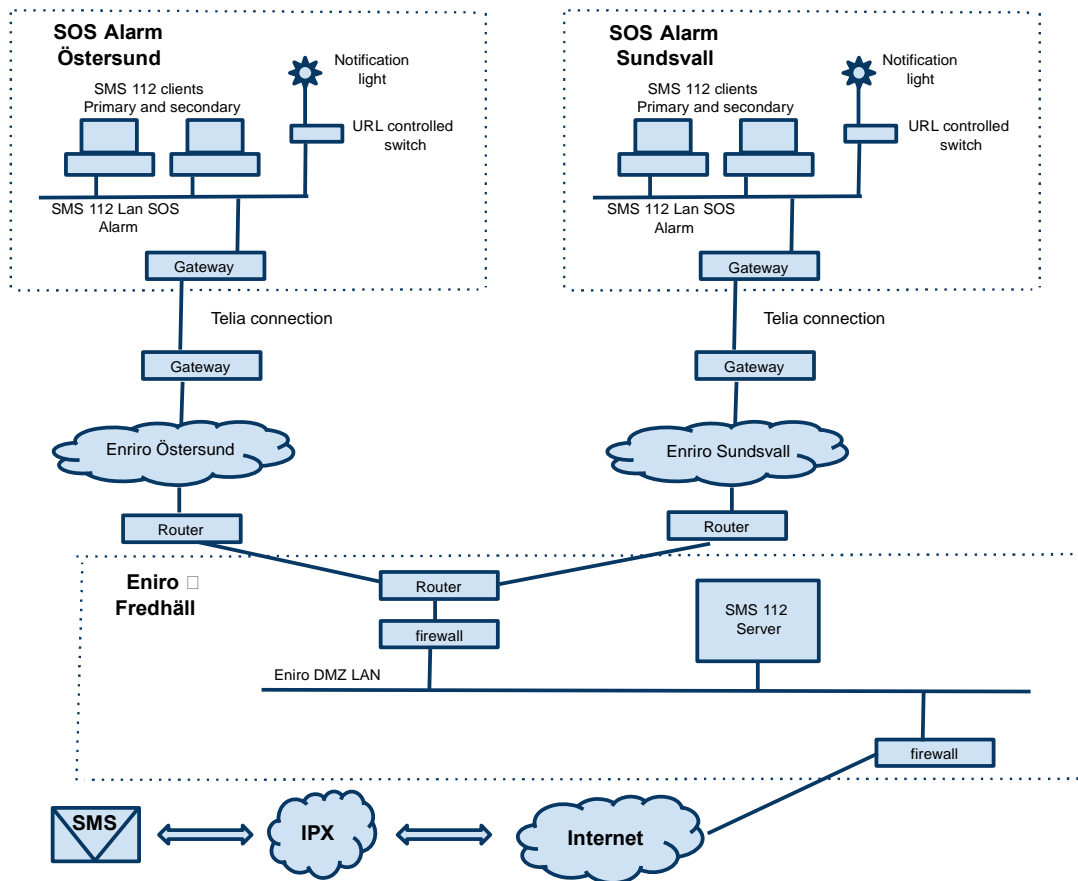


Figure 3: SMS 112 Network overview

Redundancy

The server applications are on only one server (in fact several servers for various parts of the application, but only one instance of each), which means that the software has no redundancy.

The communication from the SOS operator who sends the SMS to the servers (in Stockholm) has no redundancy; neither does communication between the servers and the locations where the client application is found. There is redundancy in communication however to the extent that the service is located in two places.

There is also redundancy at each place, since there are two clients at each place.

Power supply for the servers goes via a UPS. Communication between servers and client goes via Eniro's establishments in the respective places and these also have UPS. The clients at the SOS Centres are connected via a UPS.

Comments from users about the service

Swedish National Association of the Deaf

1. What we have discussed with SMS 112 is how we could get more users to use the service - which is a key question.
2. Registration for SMS 112 is a dilemma that we have discussed at length.
3. We have also proposed establishing a second number that is not for "emergency calls", such as SMS 147 for example, which could be used for help with things like car breakdowns.

Statistics on users

Number of active customers

County	2010								
	Jan	Feb	March	April	May	June	July	Aug	Sep
Blekinge	13	12	12	12	12	12	12	12	12
Dalarna	56	54	54	54	54	55	54	54	54
Gotland	4	4	4	4	4	4	5	5	5
Gävleborg	21	20	20	20	20	20	20	20	21
Halland	15	15	15	15	15	15	15	15	17
Jämtland	21	18	18	18	18	18	19	19	19
Jönköping	33	36	36	36	37	37	37	37	37
Kalmar	17	17	17	18	18	18	18	18	18
Kronoberg	14	14	15	15	15	15	15	15	15
Norrbottn	27	27	27	27	27	27	28	28	28
Skåne	165	167	168	171	171	175	175	177	178
Stockholm	381	386	389	396	399	399	400	403	412
Södermanland	24	26	26	26	26	26	27	27	28
Uppsala	87	85	85	85	86	86	86	86	86
Värmland	19	21	22	22	22	22	22	22	22
Västerbotten	45	45	45	45	45	46	46	46	46
Västernorrland	80	85	85	85	85	87	88	88	88
Västmanland	32	27	28	28	28	28	28	28	28
Västra Götaland	289	288	289	290	291	292	293	295	296
Örebro	262	267	269	269	271	271	272	282	283
Östergötland	42	41	45	45	45	45	45	45	45
Total	1647	1655	1669	1681	1689	1698	1705	1722	1738