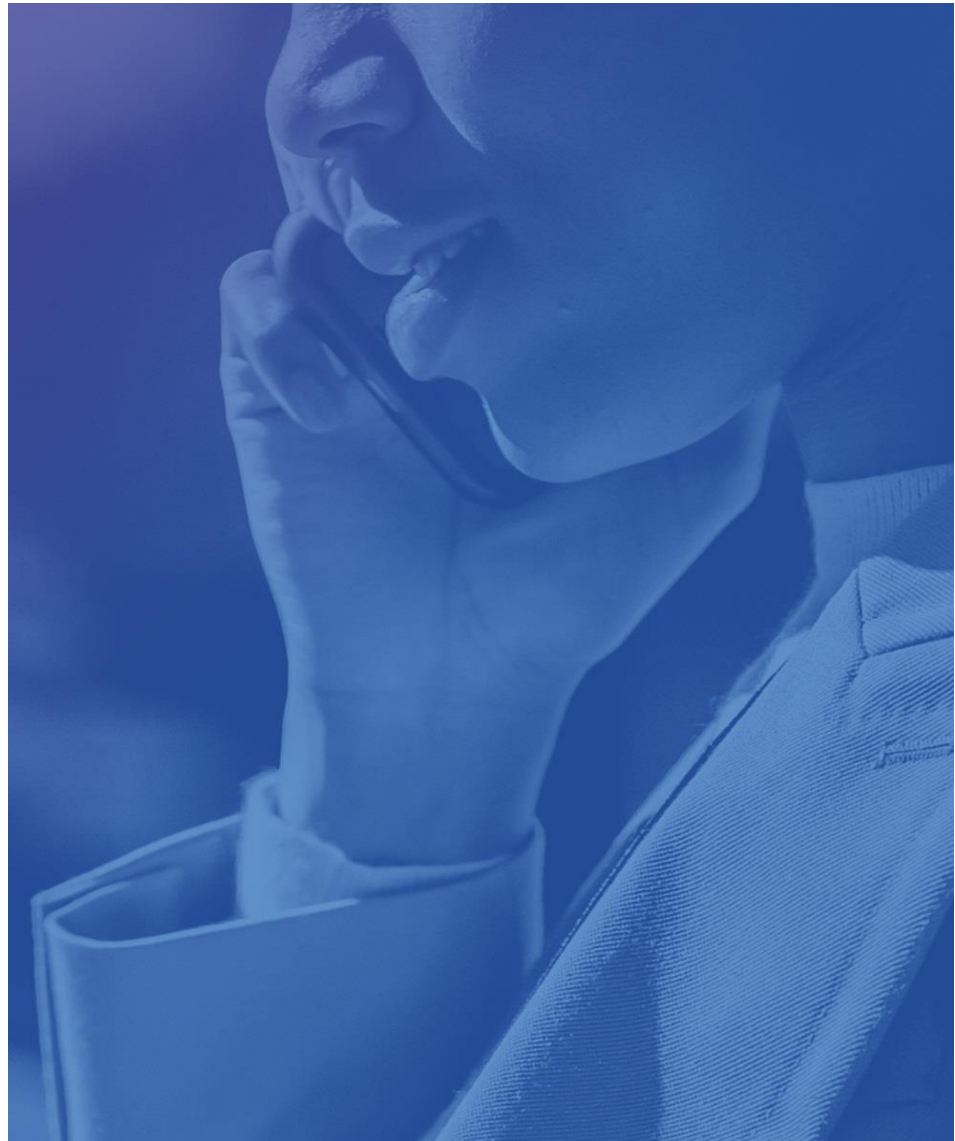PTS

Guidelines for Providers

Recommended actions for preventing calls with manipulated A-numbers (known as 'spoofing').

PTS

1.   Introduction

Spoofing involves the telephone number of the caller (known as the A-number) being manipulated such that it appears to the person receiving the call as if the call is coming from someone other than the actual caller. In other words, it may appear that the person calling is, for example, someone you know, a bank or a public authority. This can lead, for example, to the person being called being deceived into believing that it is their bank calling and thereby being duped in to disclosing their card details, logging into their bank account or signing something with their electronic ID, e.g. BankID. Spoofing is often used as part of an attempt to obtain by deception some valuable personal information that can be used for the purposes of fraud or to be sold on. The aim of the fraudsters is often to obtain money in one way or another.

1.1   Background

The problem of spoofing was first noted in Sweden in around 2018. Since then, the problem of spoofing, and the use of spoofing for telephone fraud, has increased. Both individuals and companies in Sweden have been affected. The problems associated with spoofing include its negative impact on trust in and the use of telephone services. In the report *The Deadly Frauds*[1], the Swedish Police conclude that there is a link between cases of fraud and fatal gun violence in Sweden. The analysis *The Proceeds of Fraud 2022*[2] shows that the proceeds from various forms of telephone fraud were SEK 619 million in 2022.

A number of market participants contacted the Swedish Post and Telecom Authority (PTS) in 2022. They were of the opinion that regulations relating to spoofing were required because all participants in this market need to take action in order to tackle this problem. The Swedish Police, the Swedish Bankers' Association and the Government Offices of Sweden, among others, have recently addressed this issue. Spoofing is also a problem in many other countries. At the international level, work is taking place within CEPT ECC WG NaN2[3] that has resulted, among other outcomes, in the production of a recommendation, *Draft ECC Recommendation (23)03 –*

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[1] Swedish Police Authority, *De dödliga bedrägerierna*, Reg. no. A554.314/2022.
https://polisen.se/siteassets/dokument/ovriga_rapporter/de-dodliga-bedragerierna2.pdf/download?v=717ec4909daf141673fabecf62435aab

[2] Swedish Police Authority, *Brottsvinsterna för bedrägeribrottsligheten 2022*, 21/04/2023, Reg. no. A232.846/2023

[3] CEPT (European Conference of Postal and Telecommunications Administrations) is an organisation that brings together regulatory authorities in the European postal and telecommunications sector. Within the CEPT there is the ECC (Electronic Communications Committee), which has in turn initiated a number of working groups, including Working Group NaN2.

Measures to handle incoming international voice calls with suspected spoofed national E.164 numbers[4], which is expected to be adopted at the end of 2023. Several regulatory authorities in European countries have drawn up measures to tackle spoofing in similar ways to those set out in these guidelines.

1.2   Relevant provisions

Powers linked to the management of spoofing fall within the scope of provisions in the Electronic Communications Act (2022:482)[5] and the Electronic Communications Ordinance (2022:511)[6]. These powers include authorisation for PTS to adopt numbering plans and to issue regulations concerning these plans and their use. Numbers from a national numbering plan may only be used if permission is granted by PTS. The Electronic Communications Act and Ordinance give PTS the power to issue regulations concerning the more detailed requirements that are to be imposed on a voice telecommunications service that enables identification of the calling or connected telephone number or call forwarding.

1.3   These guidelines

These guidelines forms one part of the effort to impede and prevent spoofing in Sweden. When spoofing Swedish telephone numbers it is common for these calls to be generated outside of Sweden and thereby to enter Sweden via an international network interface. These guidelines describes how calls with Swedish telephone numbers that originate abroad can be managed when they arrive in Sweden. This is a means to protect end-users from fraud committed using such calls. PTS makes the assessment that the incidence of spoofing in Sweden can be reduced markedly through providers adhering to the recommendations set out in these guidelines.

The new Electronic Communications Act gives PTS the opportunity to issue regulations relating to spoofing. The aim of these guidelines is to give providers support on how they can work to combat spoofing, pending binding regulations being decided on by PTS. PTS makes the assessment that these regulations will be in place in 2024. The regulations will replace these guidelines.

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[4] https://www.cept.org/ecc

[5] https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-2022482-om-elektronisk-kommunikation_sfs-2022-482/

[6] https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/forordning-2022511-om-elektronisk-kommunikation_sfs-2022-511/

PTS has produced these guidelines in consultation with representatives from a few providers and the Swedish Telecom Advisors[7]. While this work has been taking place, PTS has also been engaged in a dialogue with the Swedish Police Authority.

1.4   Words and terms in these guidelines

An entity that provides or intends to provide a public telecommunications network or an associated facility is, in accordance with Chapter 1, Section 7 of the Electronic Communications Act, an operator. The term provider is used in the Electronic Communications Act and underlying EU directives to describe companies that provide electronic communication services without necessarily being operators. Colloquially, the term operator is sometimes used for both of these categories.

Definitions that apply in these guidelines:

Provider: an entity which provides an electronic communications service that

- via an international network interface receives calls that originate abroad,
- with its own HLR/HSS[8] (equiv.) provides mobile telephony services or IoT services to end-users,
- e.g. corporate switchboards/call centres that are located outside Sweden but where calls take place to customers in Sweden using Swedish numbers.

International network interface: the point at which an international call enters Sweden.

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[7] https://telekomradgivarna.se/
[8] Home Location Register/Home Subscriber Server

2.   Transfer of number information

Transfer of number information during calls takes place in various parts through the public electronic communications networks. At the start of the call number information from the calling end-user is handled, also handled is the transfer of number information between the networks for process of the call and finally, number information about the calling end-user is presented to the called end-user. In some cases number information will not be presented to the called end-user, e.g. if the calling subscriber has a protected or secret number.

For calls that enter Sweden via an international network interface the number information will be handled by the first recipient network and then transferred onward to the called end-user as in the case of a national call.

With regard to the transfer of number information to/from end-users and between networks, this has not been subject to more detailed regulation on the part of the legislature, except when it comes to blocked calling line identification, which is regulated in Chapter 9 of the Electronic Communications Act. In addition to this, the number format for transfer to networks and between networks is not regulated specifically in the Electronic Communications Act, regulations issued by PTS or the adopted Swedish telephony numbering plan.

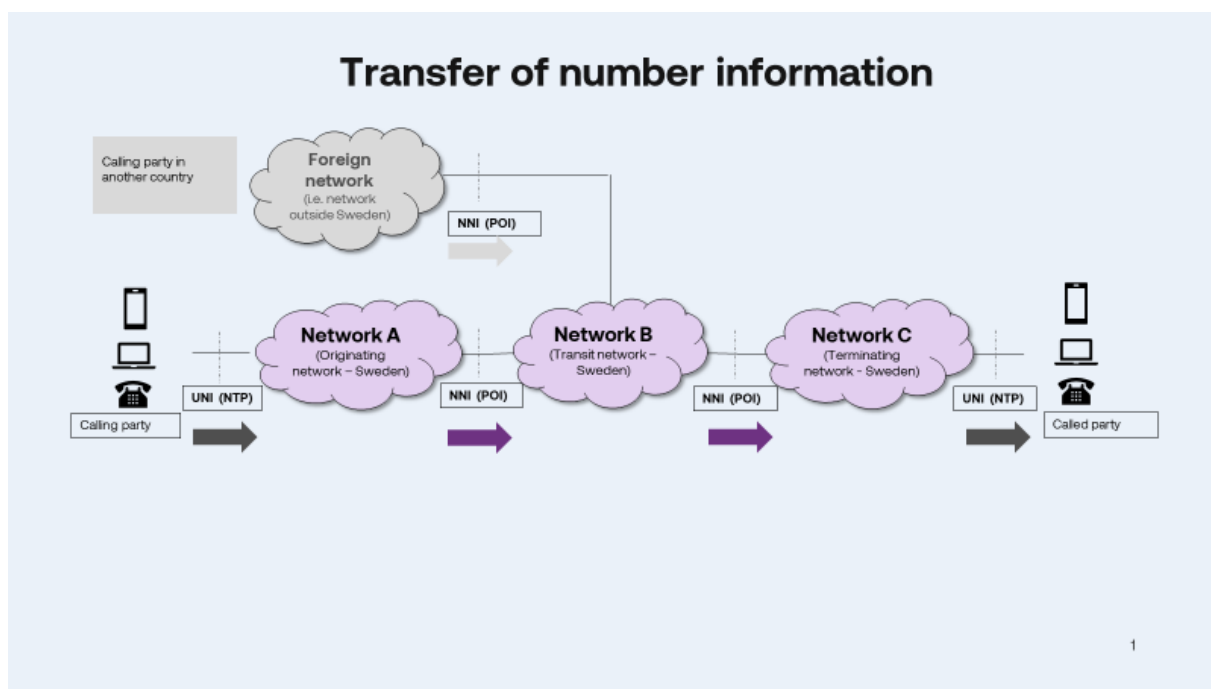The image below shows a schematic illustrating number transfer in public electronic communications networks.

Figure 1 – The image provides a general description of the transfer of number information between different electronic communication networks. NNI (network-to-network interface)/POI (point of interconnection) means the point at which hand-over from one network to another takes place. UNI (user network interface)/NTP (network termination point) means the point at which a subscriber is connected to the network.

3. Scenarios covered by these guidelines

3.1 Introduction

It is generally the case that Swedish telephone numbers[9] are to be used in Sweden and these do not normally enter the country via an international network interface. Providers have limited or no opportunities to identify the subscriber who is calling when it comes to calls entering Sweden via an international network interface (i.e. from abroad). This is because it is not uncommon for a call to have passed through the networks of several providers and for there to be no information about the origin of the call. Consequently, providers do not know if the caller is entitled to use the number shown as the calling party number (i.e. A-number).

PTS recommends that providers implement measures for all calls that enter Sweden from another country via an international network interface and where the caller ID starts with country code 46.

Measures are recommended for the following scenarios:

- Incoming calls from another country where the calling number is **a Swedish fixed number** (see 3.2).
- Incoming calls from another country where the calling number is **a Swedish number for mobile services, including telematic services** (see 3.3).

The recommended measures for fixed numbers are different from those for mobile numbers. Because mobile numbers can be used abroad through roaming, verification must take place of whether the number/subscription is currently being used outside of Sweden before any action is taken.

According to CEPT ECC's recommendation, it is important that the measures implemented do not affect calls where there is reasonable justification why a national number originates abroad. The recommendation also contains an appendix that describes a number of different scenarios for situations where there may be reasonable justification why national numbers originate abroad and which may be

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[9] A summary of the Swedish telephony numbering plan is available on the PTS website, https://pts.se/sv/bransch/telefoni/nummer-och-adressering/telefoninummerplanen/telefoninummerplanens-disposition/ .

relevant to take into account in, for example, those situations described in section 3.2 on recommended solutions in certain cases.

Providers that implement the measures described in these guidelines also need to be aware of and prepared to quickly handle potential situations where calls with Swedish numbers are blocked, despite there being reasonable justification for these arriving in Sweden through an international network interface.

3.2   Handling of incoming calls with Swedish fixed numbers

This section describes how calls with **Swedish fixed numbers** that enter via an international network interface can be handled. When forwarded calls enter Sweden via an international network interface there is not always the opportunity to determine whether the call actually comes from the specified A-number, and a special recommendation for these calls is therefore provided below.

The recommended measures also encompass numbers that

- have not been assigned to a provider by PTS, and
- numbers that do not match the format that numbers have in the Swedish telephony numbering plan.

There are also situations where there is reasonable justification why Swedish fixed numbers originate abroad. Examples of this can be private branch exchanges (PBX) and call centres that are physically located abroad but still want to be able to display a Swedish number as the A-number as calls are being made to customers in Sweden. How these can be handled is described below in the section 'Recommended measures when blocking is not to be applied'.

Number series affected:

- All numbering plan areas
- Location independent services (NDC 10)
- Freephone services (NDC 20)
- Telematic services, fixed line (NDC 378)
- Paging services (NDC 74)
- Personal numbering services (NDC 75)
- Shared cost services (NDC 77)
- Premium-rate services (NDC 900, 939, 944)
- Mass call services (NDC 99)
- Other NDCs that are allocated in the telephony numbering plan, aside from those mentioned in 3.3.

Domestic-specific numbers (numbers that are unreachable from abroad):

- National corporate number (90XYZ)
- Number from the 11 series (112, 114 XY, 116 XYZ, 117 X, 118 XYZ)
- Operator-specific services (078) (internal number on a network)

The dialling plan:

- Carrier selection code (95XY)

Recommended measures

- Providers that receive through an international network interface a call for which the A-number is a Swedish fixed number can
    - block the call
- Providers that receive through an international network interface a forwarded call for which the A-number is a Swedish fixed number can
    - hide the number so that it is not shown to the called subscriber

Recommended measures when blocking is not to be applied

- As mentioned above there are cases where there is reasonable justification why a Swedish number originates abroad, for example from private branch exchanges and call centres. In order to prevent these calls being blocked, providers can, for example, offer these users a VPN tunnel or a direct fibre connection. Such solutions would result in the number not entering Sweden through an international network interface and instead coming directly to the relevant provider.

3.3   Handling numbers for mobile services, including telematic services

This section describes how calls with **Swedish mobile numbers** (MSISDN)[10] that enter via an international network interface can be handled. Because Swedish subscribers who are abroad have to be able to call home to Sweden, it is not always possible to make an immediate assessment of whether or not such a call is correct without validation of the number taking place. In these cases, validation involves checking whether or not the subscriber with the calling number is in Sweden. How

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[10] Mobile Station International Subscriber Directory Number.

validation can be done is described in section 3.3.1. There are also situations where it is not possible to determine whether or not a call with a Swedish A-number that enters Sweden through an international network interface is a correct call. This is the case for forwarded calls, which is why a special recommendation for these calls is provided below.

The recommended measures also encompass numbers that

- have not been assigned to a provider by PTS, and
- numbers that do not match the format that numbers have in the Swedish telephony numbering plan.

Numbers affected

- Mobile telephony services (NDC 70, 72, 73, 76, 79)
- Mobile broadband services (NDC 71 with 0 as the first subscriber digit)

Recommended measures

- Providers that receive through an international network interface a call for which the A-number is a Swedish number for mobile services can validate the number by checking:
    1. that the calling number belongs to the Swedish telephony numbering plan
    2. whether the calling number (the subscriber) is abroad.
        - If the result of validation shows that the subscriber is abroad, the call is let through because it may be presumed that the subscriber is the calling party.
        - If the result of validation shows that the subscriber is not abroad, the call may be blocked.
- Providers that receive through an international network interface a forwarded call for which the A-number is a Swedish number for mobile services, including telematic services, can
        - hide the number so that it is not shown to the called subscriber

Calls that are not covered by the recommended measures

- Numbers for telematic services for mobile networks (071 9) are exempted from the recommended actions. Because these numbers may be used

extraterritorially[11] these numbers are let through when they enter via an international network interface.

- No validation needs to take place when the called party number (known as the B-number) is a Swedish mobile number (MSISDN) that is being used as a Mobile Station Roaming Number (MSRN), i.e. a number that is allocated to a foreign subscriber who is roaming in Sweden. Calls to these numbers are let though when they enter via an international network interface.

3.3.1 Validation of calls that enter from abroad via an international network interface

Validation of incoming calls where the A-number is a Swedish mobile number can be done in various ways.

One way to validate is for the party receiving the call at an international network interface to send a query to the provider that owns the number whether or not the calling party number is roaming. Depending on the response, the party who has received the call can determine whether or not it is possible to connect the call.

Another way to do this is for the providers collectively to work out a solution that is open to all providers who want to use it. It is recommended that this function be able to convey answers to questions that validate whether or not the number is roaming. A shared function such as a proxy server has certain advantages. With such a function it is not necessary to open any signalling interface between different providers or to convey the information about the subscriber's status between different providers. Such a function also provides the opportunity to supply an interface that is not dependent on information being sent using a certain protocol and can instead perform protocol conversions so that the query interface is not tied to the mobile network technology and it is able to offer various alternatives for submitting queries and for responding to queries. This makes it possible to minimise the volume of information that needs to be exchanged, which is important from the perspective of both confidentiality and security.

There may also be other possible solutions for validating whether a subscriber is abroad.

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[11] Extraterritorial use of telematic numbers means that these numbers may be used in another country within the European Union.