
SIP Trunk Service Level Agreement

Version 2.1

Contents

1. INTRODUCTION	3
2. TERMS AND DEFINITIONS.....	3
2.1 EXAMPLE	4
3. SERVICE LEVELS.....	5
3.1 SERVICE PARAMETERS	5
3.2 PROACTIVE MONITORING	5
3.3 SERVICE LEVEL OVERVIEW	6
3.4 NETWORK STRUCTURE – NETWORK/SOLUTION REDUNDANCY	7
3.5 FAULT REPORTING	8
3.6 CALL SUCCESS RATIO AND NUMBER OF CORRECTLY ENDED CALLS	8
4. ORDERING AND DELIVERY.....	8
4.1 DELIVERY TIME	9
4.2 ACKNOWLEDGEMENT OF DELIVERY	9
4.3 NON-COMPLIANCE	10
4.4 PRE-DELIVERY REQUIREMENTS	10
4.5 PHYSICAL ACCESS TO THE PLACE OF INSTALLATION	11
4.6 INCONVENIENCE CAUSED BY THE INSTALLATION	11
5. STATUS INFORMATION AND REPORTING	11
5.1 INFORMATION AND FAULT REPORTING	11
5.2 ESCALATION	12
5.3 CASE STATUS REPORTING	12
6. AVAILABILITY	12
6.1 CALCULATION	12
6.2 HELPDESK	14

1. Introduction

This document describes the service levels related to the Telenor SIP Trunk product. The purpose is to define Telenor's service obligations.

The document describes the proper use of terms and definitions, and is the SLA between the individual customer and Telenor concerning parameters such as availability, downtime, contact channels and fault repair (fix time) according to service level agreements with customers.

2. Terms and definitions

Table 2.1 presents the definitions of the terms used in Telenor's service agreement. All designations of time in the document refer to GMT + 1. The term "service description" in the table refers to the document that defines the design of the product.

Terms	Definitions
AVAILABILITY	The minimum availability a customer may expect from a service, expressed as a percentage of a maximum availability according to the service description. Availability is measured over a period of one month.
SERVICE TIME	The period, according to the SLA, in which Telenor offers fault handling and service (see Fault reporting time).
FAULT REPORTING TIME	The period, according to the SLA, in which Telenor receives fault reports.
START TIME	The maximum time between reporting of the fault and start of fault handling during the service time.
RESPONSE TIME	The time from the customer's first attempt to reach Telenor using a method described in the SLA and the time when Telenor responds or offers services during the fault reporting time.
FIX TIME	The maximum time within the service time (excluding suspension time) it will take to repair a fault in the service after the customer's reporting of the fault and until it has been repaired.
SUSPENSION TIME	The time within the service time when the fix time will not continue to run due to the customer's obligation to arrange for fault analysis and handling.
INTERRUPTION TIME	The total time between the customer's reporting of the fault and the time when the fault has been repaired.
DOWNTIME	The accumulated time within the service time when there are faults in the service (excluding suspension time, service window and time to planned job).
ARRIVAL TIME	The time between Telenor's submission of a receipt for the fault report to the customer and until Telenor arrives personally at the customer's location (according to the SLA).
SERVICE WINDOW	The recurring period, as defined in the SLA, used by Telenor to maintain the service without affecting the availability.
PLANNED JOB	Specific time outside of the service window which Telenor or its sub-suppliers may use to maintain the service without affecting the calculation of availability. A "Planned emergency job" is reported and completed within 24 hours and will take less than 30 minutes.
FAULT IN SERVICE	Faults in service are defined as all deviations from a fully functional service and are classified in different categories, some of which are related to availability.

Terms	Definitions
ACTUAL FAULT TIME	The time in which the service is effectively not available to the customer.
CONTACT METHODS	The contact methods to be used by the customer, according to the SLA, for service and support and the methods used by Telenor to communicate with the customer.
MEASURING POINT	The technical inspection defined in the service description for the calculation of availability.
CONCLUSION OF CONTRACT	The time when the customer and Telenor sign the contract for delivery of the service.
START OF DELIVERY	The time when Telenor has received and accepted a complete order with all the required and correct information.
SERVICE DELIVERED	The time when the service has been delivered and tested at the customer's location. The customer will receive a delivery confirmation.
DELIVERY CONFIRMATION	A document (sent by e-mail) showing that the service has been delivered.
DELIVERY TIME	The time from "start of delivery" and until "service delivered".
ACKNOWLEDGEMENT OF DELIVERY	Confirmation from the customer that the service has been delivered.
DELIVERY APPROVAL PERIOD	The period (10 days), designated by Telenor, during which the customer is entitled to complain of the service delivered.
DAYS	Days are defined as working days (Monday to Friday, not including public holidays).

Table 2.1 Terms and definitions – SLA

2.1 Example

2.1.1 Fault handling

This is an example of how the terms and definitions are used in a concrete fault case.

The customer discovers a *fault* at 8:30 AM and later reports it to Telenor. After a short *response time*, Telenor submits a trouble ticket with a case number as confirmation of the fault report. According to our definition, Telenor will immediately start fault handling, and the *downtime* calculation begins. In this example, since the fault is physical, Telenor will arrive at the customer's location after an *interruption time* as part of the fault handling procedure. When the *service time* ends at 5:00 PM, the fault handling procedure will stop, and the calculation of downtime will be suspended and will only begin when the next *service time* starts. During fault handling, the customer must restart one of its own routers. This is treated as *suspension time*, and the *downtime* calculation will be suspended. The fault is repaired before noon the next day, and the total *downtime* is calculated. This is reported to the customer and the case is closed. Later that same day, a short and previously announced *planned job* is performed, but this has no effect on the calculation of *downtime*.

Telenor SIP Trunk is covered by 24-Hour service and therefore, fault repair will take place on a continuous basis until the fault has been repaired – only for major faults.

The above example illustrates a procedure in which all definitions are described.

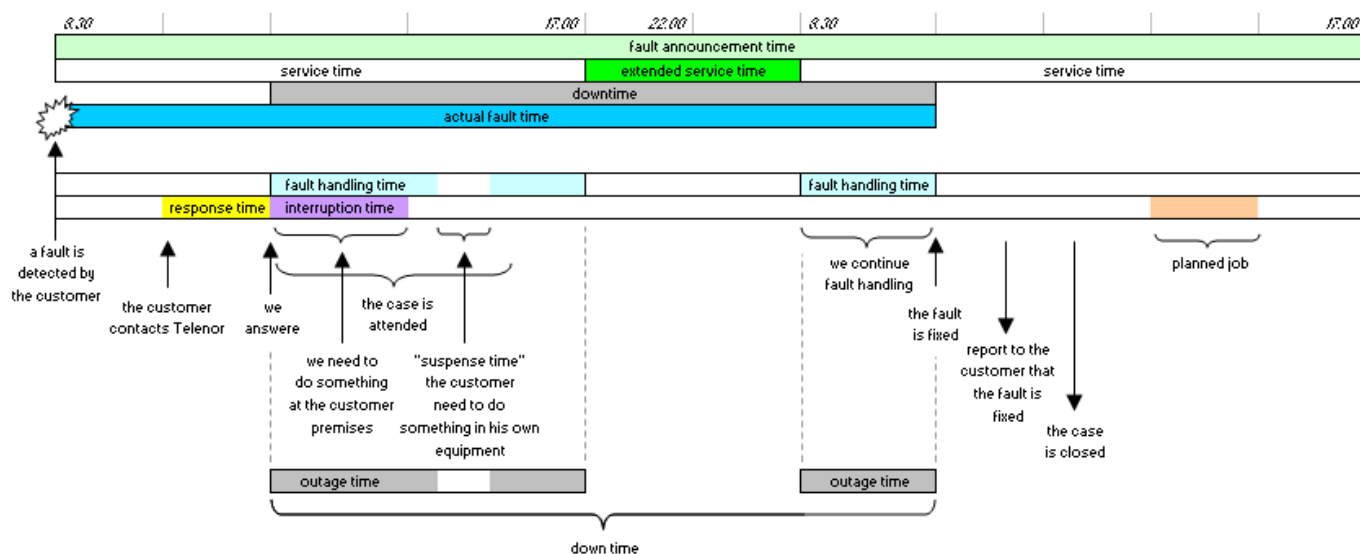


Figure 2.1 Terms and definitions used in fault handling and service support

3. Service levels

All services provided by Telenor have a related standard service level. This is described in the service description. All extensions above the standard level are treated as add-on services.

In all service combinations defined in this Service Level Agreement, the lowest service level applies to the entire combined solution. For example, an add-on service for an access line cannot have a higher service level agreement than the actual access line.

3.1 Service parameters

All service levels offered by Telenor are based on the parameters of service time, fix time and availability, cf. table 3.1. Please note that some of the service agreements are subject to special technical requirements for the implementation of the service.

3.2 Proactive monitoring

SIP Trunk has proactive monitoring.

When the connection to the CE router at the customer's location is lost, an alarm to Telenor's monitoring system is generated. Within the customer's service time, Telenor will contact the customer to inform about a possible service fault. If a thorough fault analysis and consultation with the customer show an actual service fault, Telenor will begin fault repair in accordance with the description of the customer's SLA.

Downtime is calculated from the time when the customer has clarified that there is an actual fault in the service and until such fault has been repaired. Telenor must immediately be informed of any faults in the service discovered by the customer, irrespective of the proactive monitoring.

Telenor contacts the customer's contact in accordance with the agreement concluded with the customer.

3.3 Service level overview

The overview below shows the available service levels for SIP Trunk.

Service level	Product profile	Service time	Physical fix time	Remote fix time	Automatic failover	Availability per month	Technical requirements
4.3	Basic Plus	All days, 24 hours	< 8h	< 4h	No	99.6%	None
6.0	Advanced	All days, 24 hours	< 8h	< 4h	< 3 min	99.9%	See technical requirements in table 3.2.

Table 3.1 Service level overview

It is assumed that any technical requirements for the customer solution are met to ensure increased availability.

SLA level	Technical requirements
SLA 4.3	The IP access must be routed by Telenor.
SLA 6.0	<p>IP access to an alternative routed line must be of the same size and the same type as the primary line.</p> <p>The customer must ensure redundant power supply at the customer location for router operation.</p> <p>The alternative routed line must have the same SLA level as the primary line.</p> <p>The alternative routed line is standby for the primary line (active/passive).</p> <p>An Advanced profile is required for SLA 6.0.</p> <p>The IP access must be routed by Telenor.</p>

Table 3.2 Technical requirements

Hosted solutions

The standard connection from Telenor until the hosted PBX/Lync service is SLA 4.3, as this is considered a part of Telenor's network. SLA 6.0 may be purchased at an extra cost. The current SLA level depends on the technical setup against the partner hosting the PBX/Lync functionality – reference is made to the specific setup documentation.

SLA 6.0 can be purchased at Telenor IP Access (the connection between the hosting partner and the end customer address) and applies if the technical requirements specified in table 3.2 *Technical requirements* have been met.

Third party routing (of end customer connection)

It is possible to select a third party (other operator) for physical routing (internet or MPLS connection) of the SIP Trunk to Telenor, if applicable in combination with a hosted PBX functionality (physical routing to hosting partner).

Note – if Telenor does not deliver the end customer connection (Telenor IP Access), Telenor cannot guarantee uptime and the experienced/measured call quality at the end customer. In such cases, the delivered/specified SLA level will only apply to the service in Telenor's network until the access point for the customer.

The quality of a SIP Trunk routed via third party routing will be considered as Best Effort.

The customer is responsible for ensuring the company's internal network by setting up firewall functionality, e.g. via Internet routing. In hosted solutions, this service can typically be purchased directly from the hosting partner.

It is not possible to purchase SLA 4.3 and SLA 6.0 from Telenor for third party routing.

It is not possible to purchase WAN and/or Internet services from Telenor for third party routing.

General

Telenor recommends that the customer's LAN is based on category 5 cabling or higher to ensure the best possible quality.

3.4 Network structure – network/solution redundancy

By choosing the Advanced profile, it is possible to obtain higher availability, as this product profile allows redundant solutions. Please note that technical requirements apply to Advanced.

Redundancy in the individual network components used for SIP Trunk is explained in the figure below.

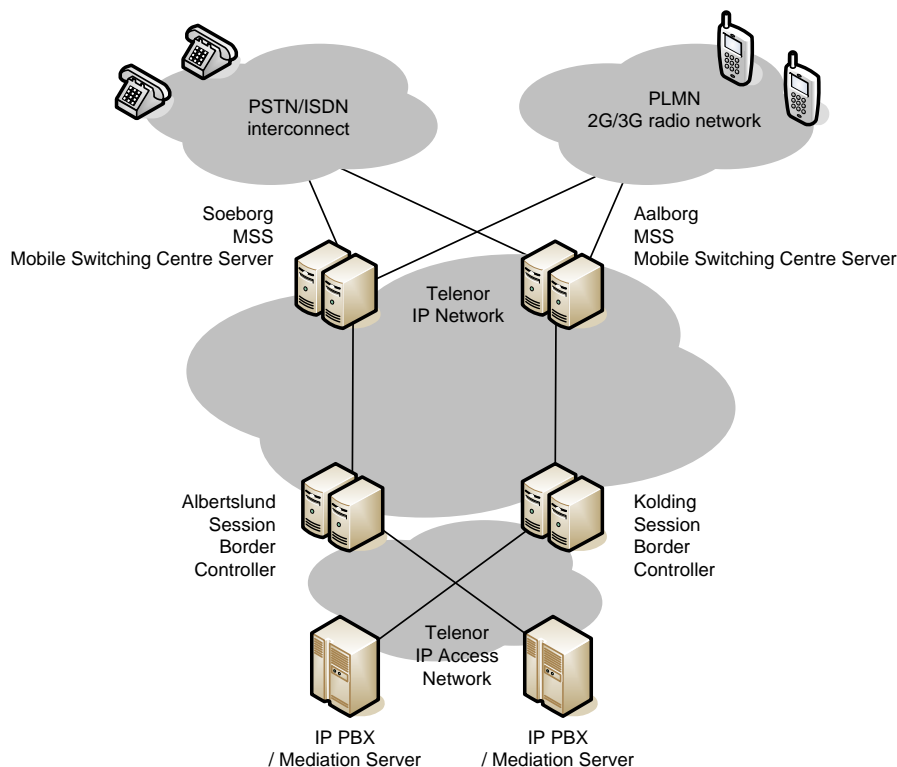


Figure 3.1 Network structure

MSS

The Mobile Switch Center Servers (MSS) are Telenor's telephony centrals for mobile as well as fixed-line telephony. The internal MSS structure is redundant, and hardware faults therefore do not affect the traffic. The MSS's have geographically separate locations.

SBC

A Session Border Controller (SBC) comprises two identical hardware units in an active/standby configuration. The SBC's have geographically separate locations.

The individual elements are fully redundant within the individual site but geographical redundancy for the customer depends on the selected profile. Furthermore, the redundancy depends on the structure of the solution and its technical requirements.

The IP network

The IP network has redundant routers. This means that a router can be taken out of service without affecting the traffic.

The IP Access network.

The IP Access network is LMA (Last Mile Access) to the customer and is the connection(s) that connect(s) the IP network to the customer. The customer generally has only one access connection to the IP network. If higher security against fibre breakdown etc. is requested, alternative routing can be purchased (redundancy) and it is possible to change to the Advanced product profile. If a full redundancy is requested, the alternative routed line must be of the same size and type as the primary routing.

Note – full redundancy involves termination requirements for the customer, e.g. that the customer's equipment is connected to backup power supply. Telenor is only responsible for the redundancy in Telenor's network until the termination point at the customer's premises (CE router).

If Telenor does not deliver the end customer connection (IP Access)

3.5 Fault reporting

Applies to all SLA levels:

Fault reporting time	24 hours, all days
Response time	< 20 sec. for 80% (telephone) < 30 min. for 100%. (fax, e-mail)

Table 3.3 Fault reporting

3.6 Call success ratio and number of correctly ended calls

The below table specifies the call success ratio and the share of correctly ended calls.

Parameter	Explanation	Quality
Outgoing call success ratio	Number of calls from IP PBX set up correctly. The called subscriber may be busy which is considered to be correctly set up.	99%
Correctly ended outgoing call	Number of calls correctly set up and correctly ended (i.e. no drop-out during call).	99%
Correctly ended incoming call	Number of calls correctly set up and correctly ended (i.e. no drop-out during call).	99%

Table 3.4 Call success rates and share of correctly ended calls

Telenor guarantees only traffic within its own network.

4. Ordering and delivery

The delivery times indicated are considered binding maximum times from Telenor. When placing an order, the requested delivery date must be stated. The order confirmation from Telenor will, if

possible, confirm the requested delivery date or indicate another date, if it is not possible to deliver by the requested date. Confirmation of the delivery date must be submitted within 15 days.

Delivery will always take place within normal working hours (Monday to Friday between the hours of 8:00 AM and 4:00 PM). All requests for delivery and implementation outside of this period will be subject to additional fees. Such requests must be stated in the order and will only be granted if received in due time and accepted by Telenor. Changes in the configuration, access line or CPE may imply a downtime of between 0.5 and 4 hours.

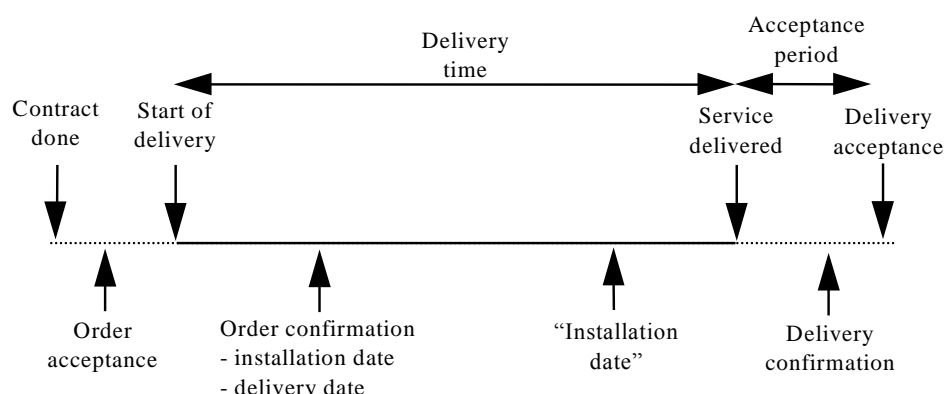


Figure 4.1 Visualisation of different milestones for ordering and delivery

4.1 Delivery time

SIP Trunk (based on Nordic Connect Managed)		
Delivery type	Description	Value ¹⁾
New access ²⁾ SIP Trunk	Establishment of new radio link	40 days
New access ³⁾ SIP Trunk	Establishment of fibre	40 days
Change of configuration	Change of service parameters within the existing service (not including change of bandwidth)	5 days
Change of bandwidth, software	No physical change required	5 days
Change of bandwidth, hardware	Requires a physical change	As new access
Termination	The period from receipt of a written termination from the end of the month after receipt of the termination	1 month

¹⁾ All days are working days. All times indicated in "days" are maximum times.

²⁾ The delivery time applies to the standard product delivered via a radio-based link.

³⁾ Fibre delivery times are stated as the typical maximum time but reservation is made for a longer period of time if such delivery requires digging.

Table 4.1 Delivery time for SIP Trunk services

4.2 Acknowledgement of delivery

When the router/switch at the customer's location has been physically installed, and Telenor has configured the service from the operations centre, the service is considered as delivered. When the service has been configured, measurement and reporting of the technical quality start immediately. The customer will receive a test report specifying that Telenor has tested the connection and the service and the result of such test. If the test is not ok, the line is not considered to have been correctly delivered. From the time when the delivery is reported to be ready, the customer will

have an approval period of 10 working days to test the functionality of the service. If the customer discovers any faults in the service delivered by Telenor, which faults considerably reduce the customer's possibility of testing the network, the parties may negotiate an extension of the approval period.

If the customer has not discovered any serious faults before the end of the approval period, the service delivered will be regarded as being in conformity with the contract. If the customer discovers any faults during the approval period, the customer must contact Telenor immediately via Helpdesk or its contact. If the fault occurs during the approval period, an amount will be credited to the customer on the first invoice.

4.3 Non-compliance

If Telenor discovers any non-compliance with the agreement in connection with the delivery, Telenor must notify the customer's contact at the place of installation and the customer's coordinator. If the customer discovers any non-compliance with the agreement in connection with delivery, the customer must notify the contact stated in the order confirmation. If otherwise agreed in specific projects, the guidelines agreed for the project must be followed.

Note – An unended number porting is not seen as non-compliance as circumstances with the customer or the donor operator may make it impossible to go through with the number porting as agreed.

4.4 Pre-delivery requirements

Telenor expects the customer to meet the following requirements for pre-installation preparations:

1. Telenor installs the systems at the customer's location. Space must be cleared for Telenor's equipment in a room of at least 1 x 1 x 1 metres. The room must be a normal office environment with regard to temperature, humidity and atmospheric dust/cleanliness. This means that the requirement for the installation room is within the temperature range of 10° C – 35° C and with a relative humidity (non-condensing) of 20% – 80%.
2. Access to the installation room and equipment should be restricted to authorised staff. If radio access with antenna is used, the customer must accept and authorise installation of equipment before the installation starts.
3. Electricity and separate circuits etc.
The rooms must be fitted with the required and correct electricity supply of 230 V, 50 Hz (with earth connection) close to the equipment. The electricity supply should preferably be on a separate circuit. The mains voltage may vary by +/- 10 %. The frequency may vary by +/- 1 %.
The equipment will not be delivered with UPS.
4. Electrical noise and voltage peaks.
Abnormally strong electrical interference is not allowed in the immediate vicinity of the room. Common transients (office environment) may have a duration of up to 0.2 milliseconds. Although variations as mentioned occur within the mentioned limits, it may not result in interruptions. The responsibility for avoiding damage to equipment due to voltage peaks, e.g. from lightning, lies with the customer.
5. Distribution network and cabling.
Unless otherwise expressly agreed, all connections between implemented Telenor equipment and lines to other units may be created without a requirement for fixed cabling.
6. Other suppliers/contractors
If implementation of the delivery requires help from other suppliers, e.g. the suppliers that have already delivered equipment to the customer, the customer must ensure that they are available to Telenor without delay.
7. Availability at the time of installation.
The contact must be available (on his or her mobile or the like) to Telenor at the agreed time and place of installation. The contact must have access to the rooms in which the equipment is to be installed, and must have keys and/or other equipment required to have access to the location and the place of installation.

8. Delivery knowledge and information.
The contact at the place of installation must be in possession of the information and have the knowledge required by Telenor to perform the job to the satisfaction of both parties.
9. Before the system is installed, unless otherwise agreed, the customer must make the following preparations in the rooms: The customer must provide 230 V power supply with earth connection.

Otherwise, there are no specific requirements for the rooms other than the Danish Working Environment Service's requirements for office premises.

In accordance with good supplier practice, the supplier must check well in advance of the installation of the system that rooms and installations meet the requirements in the appendices. The supplier must give the customer written notice of the result of this check in order for the customer to be able to remedy any defects.

4.5 Physical access to the place of installation

Telenor must be given free access to communication with the service interface. Telenor must be authorised to make the necessary installations and line installations on and in all buildings at the installation address.

4.6 Inconvenience caused by the installation

No compensation will be paid for inconvenience caused by the installation of access at the customer's location.

5. Status information and reporting

5.1 Information and fault reporting

Telenor constantly monitors all its services for production and performance faults. As a result, the customer may have access to a number of different forms of information and fault reports. The method used is closely connected with the relevant product and the agreed service level and its related communication channel. The different status and information reports are shown in table 5.1.

Service level	Means of contact	Information	Frequency	Notice of planned job
4.3 6.0	Web/telephon e/e-mail	General performance information with specific fault descriptions	Every four hours or in case of status change, whichever occurs first ⁽¹⁾	E-mail

Table 5.1 Overview – contact channels and information types

¹⁾ Or as agreed with the customer. When a fault affects a large number of customers (more than 20), fault handling will be given priority, and customers will be contacted as quickly as possible. In this situation, updating fault reports on the Internet will be given top priority.

5.2 Escalation

When service management is not performed as described in this document or the service description for the product in question, this escalation procedure may be used. Escalation takes place via Helpdesk.

1. Helpdesk, technician
2. Helpdesk, manager
3. Technical manager for the service
4. Operations manager for the service
5. Other persons responsible for the service

5.3 Case status reporting

Fault tracking, handling and reporting are reported to customers as follows:

The case status is reported in accordance with table 5.1. If the customer wishes to follow a specific case, he or she must use a unique case number which is allocated to the fault when it is reported.

The customer is informed of the status of faults classified as major faults every four hours. Reports of all other types are updated as soon as status changes occur.

6. Availability

6.1 Calculation

Availability is measured from the time of delivery and is calculated monthly. All time during the period up to delivery is treated as if availability was 100 per cent.

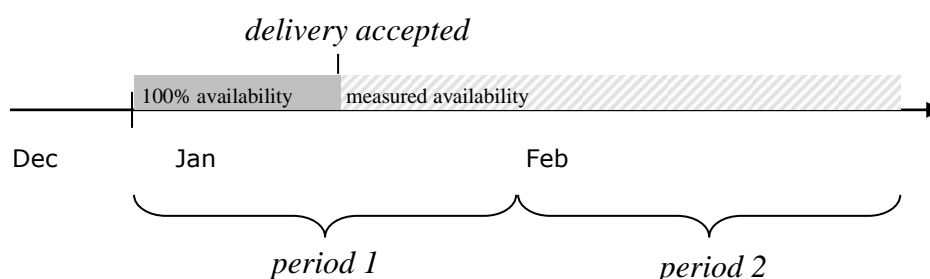


Figure 6.1 Calculation of availability for the first month

Availability is based on a measurement of the downtime, according to the above definition, during the period, including the total time during which the service is offered, excluding suspension time, service windows and planned work. The calculation formula is shown below.

$$\text{AVAILABILITY} = 1 - \left(\frac{\text{DOWNTIME}}{\text{MEASURING PERIOD}} \right) * 100 (\%)$$

Figure 6.2 Availability calculation formula

6.1.1 Downtime

Downtime is defined as the total period during the service time when a fault in service has been registered and classified as a major fault according to the definition in table 6.1, excluding suspension time, service window and planned job.

If it is not possible to reach the customer through the agreed channels, or if Telenor's employees are not able to gain access to equipment at the customer's location with a view to fault tracking or handling, the time passed will be regarded as suspension time and will not be included in the calculation of downtime.

If a fault in service is due to circumstances outside of the control of Telenor or Telenor's sub-suppliers, such as power failure at the customer's location, the time passed will be regarded as suspension time and will not influence the calculation of downtime.

6.1.2 Measuring period

The period used in the availability calculation is defined as all time during a period of 30 days (24 hours x 30 days = 720 hours), excluding the time allocated to service windows and planned jobs.

6.1.3 Faults in the service

Faults in the service are classified on two levels. Faults making it impossible to use the service are classified as major faults and will trigger the start of calculation of downtime. All other faults are treated as minor faults, meaning that the service may still be used, with reduced quality.

SIP Trunk		
Classification	Perceived fault	Description
Major fault	The customer is not able to use the service. The service is blocked and calls cannot be made.	It is not possible to use the service without fault tracking and recovery. Availability and therefore call success rate are generally very low according to the quality guidelines specified in the SIP Trunk service description.
Minor fault	Reduced service functionality or capacity, but the service is not blocked.	The call success rate is lower for short periods of time according to the quality guidelines specified in the SIP Trunk service description.
Irregular event	The customer does not perceive any functionality changes.	An event which currently has no effect on the customer, but which must be analysed.

Table 6.1 Classification of faults for Managed and Partner services

6.1.4 Measuring point

As the service availability calculation is based on the registration of a trouble ticket, no specific measuring point is defined.

6.1.5 Fault reporting

It is possible to report faults at any time, provided that the fault is reported through the means agreed and defined in the service description for the product (or possibly through a Telenor sub-supplier/partner). This option is not subject to any requirements for the agreed service level. Telenor confirms the report by issuing a trouble ticket/case number as soon as a fault is registered.

6.1.6 Service window

A service window is a periodically recurring time (all days 1 AM – 6 AM) when Telenor is allowed to perform support on the services delivered without affecting the availability calculations.

Generally, all customers are informed of planned jobs on the Internet at least five (5) working days before the allocated time, and of the extent to which the time will be used.

The customer chooses the contact method via Webline. Telenor is only allowed to spend 15 hours in 90 days for this type of service support. If a service window has not been reported correctly, it will be treated as downtime in the availability calculation.

6.1.7 Planned job

A planned job comprises all forms of service support performed by Telenor or its sub-suppliers, which affect customers outside of service windows. Customers who will be affected will be notified by e-mail at least five (5) working days in advance. Planned jobs of which notice has not been given correctly will be treated as downtime in the availability calculation.

6.2 Helpdesk

6.2.1 The purpose of Helpdesk

The purpose of Helpdesk is to provide one place to which the customer may direct all inquiries regarding the service after delivery. Helpdesk is responsible to the customers for fault handling and coordination of activities necessary for operative units in Telenor and any other partners. In addition, Customer Service handles all general inquiries and inquiries concerning invoicing.

6.2.2 Service parameters

Opening hours and telephone numbers

The Helpdesk is open 24 hours a day on weekdays. The Customer Service is open from 8 AM to 4 PM on working days. The Helpdesk and the Customer Service may be contacted by telephone (see below) or e-mail (see below).

Inquiry	Telephone number
Service operations – fault reporting	Specified in NYS-302 Telenor SIP Trunk – Important installation information
Customer service – general inquiries	+45 7212 0000

Table 6.2: Telephone contact information

Response time

At least 80% of all inquiries received by telephone will be answered within 20 seconds.

Inquiry	E-mail – Denmark
Fault reporting	soc@telenor.dk
General	kundeservice@telenor.dk

Table 6.3: E-mail contact information

Response time

100% of all fault reports submitted by e-mail will be answered within 30 minutes.

6.2.3 Measurement

Response time, number of faults and fault repair times will be measured by Telenor's fault registration system. This information will normally be used for internal control and as basis for improvements.