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Technical Specification

**User Group;
Quality of ICT Services;
Requirements for Check-up on Metering and
Billing Processes**



Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI User Group (USER).

Information and Communications Technology (ICT) standardization is part of the general standardization activities, and contributes to policy objectives to improve the competitiveness of European industry, as specified in the Lisbon strategy. The legal basis for European standardization and standardization policy, including the ICT domain, is Directive 98/34/EC [i.8]. One of its main elements is the formal recognition of three European Standards Organisations (ESOs), CEN, CENELEC and ETSI, active in various degrees in the ICT domain. Standards produced by the three ESOs and resulting from an open consensus building process are by nature voluntary and non binding technical documents.

The standardization work described in the present document was funded by the European Commission, Enterprise and Industry Directorate-General, as part of the 2009 ICT Standardization Work Programme and executed by ETSI.

The present document has been produced within the ETSI Special Committee USER GROUP (USER) by the Specialist Task Force (STF) 375. Several documents provided by European Telecommunications regulatory bodies have been used to develop the present document. They are detailed in TR 102 847 [i.7].

It is important to understand that Conformity Assessment takes place in the wider environment of accreditation principles as defined in European Community regulation No 765/2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 [i.6].

Introduction

A significant difference rate between theoretical and actual bills has been identified by several parties in the current metering and billing processes operated by Service Providers.

Several Service Providers, administrations and users associations have intended to reduce this difference rate in implementing rules in order to make users more confident in the reliability of their bills.

Nevertheless, due to the complexity of this issue and in absence of any available formal standard in this area, the current practices are hindered by significant limitations. The purpose of the present document is to fulfil the gaps of the current practices in order to provide a reference that can be used for a continuous and trustworthy checking up on metering and billing processes. Such a checking is expected to contribute to a continuous quality improvement of metering and billing processes.

In order to provide evidence that metering and billing verification is conducted according to the present document, it will be useful for a Service Provider to have its verification process audited by an independent party, that will formally assess the conformity of its checking-up on metering and billing with the technical specification. The purpose of TS 102 846 [1] is to define when, how and by whom the conformity assessment audit shall be conducted. Such a conformity assessment is expected to contribute to an increased trust by Service Providers, customers, regulators and other stakeholders that metering and billing processes are reasonably monitored.

1 Scope

The present document has been prepared to provide a model for designing and operating the checking-up on metering and billing processes of Service Providers.

Because the checking-up approach of the present document is end-to-end (i.e. using a "black box" approach from the actual electronic communications generation to the checking-up on their billing), it is intended that these requirements are applicable to the metering and billing of any kind of services offered by the Service Providers.

The goal of the present document is to define a standardized checking process that could be implemented by any stakeholder and is auditable by a third-party, leading to trustworthy performance indicators about the integrity of billing issued by a Service Provider.

NOTE: It is important to note that the present document does not provide any model for designing and operating the metering and billing process itself.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ETSI TS 102 846: "User Group; Quality of ICT Services; Requirements for Bodies Providing Conformity Assessment of Checking-up on Metering and Billing Processes".
- [2] BIPM: "The International System of Units (SI)", 8th edition.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI EG 202 057-2: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 2: Voice telephony, Group 3 fax, modem data services and SMS".
- [i.2] ETSI EG 202 057-3: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 3: QoS parameters specific to Public Land Mobile Networks (PLMN)".
- [i.3] ETSI EG 202 057-4: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 4: Internet access".
- [i.4] ETSI EG 202 765-2: "Speech Processing, Transmission and Quality Aspects (STQ); QoS and network performance metrics and measurement methods Part 2: Transmission Quality Indicator combining Voice Quality Metrics".

- [i.5] ETSI ES 202 765-4: "Speech and multimedia Transmission Quality (STQ); QoS and network performance metrics and measurement methods; Part 4: Indicators for supervision of Multiplay services".
- [i.6] European Community regulation No 765/2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93.
- [i.7] ETSI TR 102 847: "User Group; Quality of ICT Services; Standardization and regulation references in the Metering and Billing area".
- [i.8] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

automated robot: remotely operated machine that is able to generate electronic communications according to a predefined plan and to report about the exact execution of these electronic communications with an appropriate level of accuracy and traceability

NOTE: Its main functions are:

- electronic communication planning;
- electronic communication execution; and
- electronic communication logging.

billing error rate: for a set of electronic communications, the ratio of the total number of electronic communications having breached at least one of the billing integrity principles divided by the total number of electronic communications in the set

Billing Verification Body (BVB): organization that has skills and methods to conduct the checking-up on metering and billing processes of a Service Provider

NOTE: The Billing Verification Body can be internal (i.e. a department of the Service Provider) or external (i.e. a specialized company to which the Service Provider has outsourced the check-up on metering and billing).

checking-up on metering and billing: activities used to verify how strongly a Service Provider metering and billing activities complies with billing integrity principles

billing integrity principles: principles that must be fulfilled to state that the billing activity of a Service Provider is correct

Call Detail Record (CDR): formatted collection of information about a chargeable event (e.g. time of call set-up, duration of the call, amount of data transferred, etc.) for use in billing and accounting

continuous: characteristics of an approach that takes into consideration the constantly evolving nature of communications networks and follows a "back-to-back" principle to verify metering and billing

NOTE: Because metering and billing processes and systems evolve on a continuous basis (incidence and update), the verification of billing has to evolve accordingly and to check the billing integrity on a similar way. "Continuous basis" excludes "one shot audit approach" where verification is performed once a year or once per quarter.

customer: user who is responsible for payment for the electronic communication services

electronic communication: service that helps people communicate

NOTE: Electronic communication types include but are not limited to voice call, video call, conference call, email, SMS, MMS, USSD, web access, instant messaging, content download, TV broadcasting, etc. Electronic communications may involve one or several interconnected networks. An electronic communication may lead to billing of a financial charge to a Customer of the Service Provider.

independent observer: entity which can evidence two characteristics: independency and externality

NOTE: In the context of the present document, the independency clause means that the entity in charge of checking has some level of independence from the entity in charge of operating metering and billing within the Service Provider. The externality means that the checking entity does not have to understand all the complexity of the information systems and network components involved in the metering and billing of a Service Provider.

metering and billing: activity, within a Service Provider, which aims at charging a customer either by producing an invoice or by decreasing a prepaid account

NOTE: Metering and billing usually involve four main types of activity:

- metering is the computation of raw parameters (time, duration, etc.) of electronic communications;
- guiding is the allocation of a specific event to a specific customer;
- rating is the computation of a price of an event according to a rate plan; and
- charging is the imputation of the financial charge to the customer.

metering rules: set of non ambiguous principles set by a Service Provider to define and meter the electronic communications service it offers to its customers

prerequisites: list of basic principles and statements with regards to metering principles and tariff information that must be available prior to the implementation of checking-up on metering and billing processes

publishing mode: mean by which billing information is provided to the customer of the Service Provider

NOTE: Publishing mode may include but are not limited to paper invoice, electronic invoices, web sites, Call Centres, Intelligent Voice Response Units, SMS servers, USSD servers, etc.

Service Provider (SP): organization that provides electronic communications services to users and customers

Stratified Sample of Electronic Communications (SSEC): sample of electronic communications used to conduct the billing and metering checking process

NOTE: The sample of electronic communications is designed according to statistical method so as to provide a reasonable evidence that the billing integrity is fulfilled.

tariff information: set of principles defined by a Service Provider to price the electronic communications it offers to its customers

NOTE: Tariff information includes the definition of unit price (price for a unit billed quantity) and valuation methods (set of mathematic methods allowing transforming raw quantities into billed quantities).

tariff plan: set of principles defined by a Service Provider to price the electronic communications service it offers to one customer

NOTE: Tariff plan is a subset of tariff information.

unambiguous: characteristic of a rule that can be understood and checked by a customer by its own means without having to understand the internality of a Service Provider systems and processes

user: individual, including consumer, or organization using or requesting telecommunications services available on public or private networks

NOTE: The user may or may not be the person who has subscribed to the provision of the service. Without any specific addition this word is used to identify the telecommunication user community in general, e.g. end-users and IT&T managers who use products and services possibly conforming to standards.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

APN	Access Point Name
BIPM	International Bureau of Weights and Measures/Bureau International des Poids et Mesures
BVB	Billing Verification Body
CDR	Call Detail Record
DSL	Digital Subscriber Line
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
ICT	Information and Communications Technology
IN	Intelligent Network
MMS	Multimedia Message Service
SIM	Subscriber Identification Module
SMS	Short Message Service
SP	Service Provider
SSEC	Stratified Sample of Electronic Communications
TV	Television
URL	Universal Resource Locator
USSD	Unstructured Supplementary Service Data
VoIP	Voice over IP
VPLMN	Visited Public Land Mobile Network
VPN	Virtual Private Network

4 Approach for Checking-up on Metering and Billing

4.1 Billing Integrity Principles

By definition, the metering and billing of a Service Provider is correct if it complies with the following five billing integrity principles:

- Principle 1: Electronic communications metering (success status, time, duration, volume, and throughput) is accurate.
- Principle 2: Unsuccessful electronic communications are not billed or are billed at null price.
- Principle 3: Each successful electronic communication is billed.
- Principle 4: Billed electronic communications are metered and priced in accordance with documented metering rules and tariff information.
- Principle 5: Electronic communication billing information details provided to customers are complete, sufficient, timely, unambiguous and correct whatever the publishing mode.

4.2 Process Approach

The present document adopts a process approach for providing evidence measured by an Independent Observer according to a standardized process that a Service Provider complies with the billing integrity principles defined in clause 4.1.

According to the present document, evidence of compliance of billing integrity principles is based on the actual generation and verification of the billing of a Stratified Sample of Electronic Communications (SSEC), designed according to a predefined statistical method and performed on a continuous basis by automated robots.

As a result of the billing and metering checking continuous process, billing and metering checking reports are produced on a predefined frequency and recorded according to a predefined storage policy.

4.3 Billing Error Rate

In practice, in the history of telecommunications, no Service Provider has ever fully complied with the principles defined in clause 4.1. Moreover no industry experts would expect any Service Provider to fully comply in the future with these principles because of increasing commercial complexity, technical complexity and speed of changes.

For this reason, the approach taken in the present document is to define a standardized approach to verify how close is one Service Provider of the billing integrity principles defined in clause 4.1. This is achieved by metering a billing error rate which assesses the percentage of electronic communications that do not comply with the billing integrity principles.

By metering the billing error rate on a continuous basis and according to a standardized and auditable method, Service Providers will be able to evidence how strongly they comply with billing integrity principles.

5 Implementation Model

The billing and metering checking process itself can be executed by an internal department of the Service Provider (Full Internalization), outsourced to an external provider of monitoring services (Full Outsourcing) or by a combination of both (Mixed Model). The present document does not recommend any special type of organisational model.

The only organizational requirement is that the entity in charge of checking-up on metering and billing processes shall have an Independent Observer status as defined in clause 3.1.

6 Prerequisites

Before implementing the checking-up on metering and billing process described in the present document, the two following prerequisites shall be fulfilled by the Service Provider:

- Prerequisite 1: Metering Rules Definition.
- Prerequisite 2: Tariff Information Documentation.

For the present document, the requirement is restricted to the fact that the prerequisites information is made available to the BVB (Billing Verification Body) prior to the implementation of the checking-up process. This is consistent with the approach of the present document: the checking-up on metering and billing shall be performed by an Independent Observer on the basis of documented information.

NOTE 1: The exact legal status of Metering Rules and Tariff Information depends on the contract agreed between the Customer and the Service Provider. It is to be noted that, in several cases, such contracts are not in place. The issue of the legal value of the documents quoted in the prerequisite section is outside the scope of the present document.

NOTE 2: For residential contract, tariff information should be accessible by anyone by at least one mode (e.g. paper booklet available in retail shops, publication on a web site). For bespoke tariff information (e.g. Enterprise contracts) the mode will depend on an agreement between the different parties. The exact scope of which documents shall be published or kept confidential by the Service Provider is outside the scope of the present document.

6.1 Metering Rules Definition

6.1.1 Definition of Successful and Unsuccessful Status

[6.1.1.1] The Service Provider shall define methods and principles to define if an electronic communication is successful or unsuccessful and whether or not it should lead to a chargeable item.

[6.1.1.2] The principles of [6.1.1.1] shall be differentiated for every type of electronic communication offered by the Service Provider to its customers: voice call, video call, conference call, SMS, MMS, USSD, Web access, Instant Messaging, content download, etc.

- [6.1.1.3] The principles of [6.1.1.1] shall include the case of electronic communications spanning over more than one network. If Service Provider has not full management of all involved networks, rules shall be defined, for example based on signalisation exchanged at the interconnect point.

The definition of a successful status requires making assumptions that are arbitrary, but shall be clearly defined by the Service Provider. Successful and unsuccessful status definitions are available in several standards for different types of electronic communications. It is up to each Service Provider to make available its own definition or to rely on the standard of its choice but to states which one is used. For information, the list below provides widely accepted definitions of successful or unsuccessful electronic communications:

- **Mobile Telephony:** In EG 202 057-3 [i.2], an unsuccessful call is defined as a call attempt to a valid number, while in a coverage area, where neither the call is answered nor called party busy tone nor ringing tone, is recognized at the access of the calling user within 40 seconds from the instant when the last digit of the destination subscriber number is received by the network.
- **Fixed Telephony:** In EG 202 057-2 [i.1], an unsuccessful call is a call attempt to a valid number, properly dialled following dial tone, where neither called party busy tone, nor ringing tone, nor answer signal, is recognized at the access of the calling user within 30 seconds from the instant when the last digit of the destination subscriber number is received by the network.

NOTE: The definition of successful and unsuccessful calls should include the cases of busy called party. It is up to the carrier to decide if a call that receives a busy tone leads to a chargeable item or not. Most industry standards hold busy calls as not chargeable.

- **SMS:** In EG 202 057-2 [i.1], a successful SMS is defined as a SMS where the Short Message has been successfully sent from a terminal equipment to a Short Message Centre. (i.e. this does not imply that the recipient of the SMS has received it).
- **Data transmission:** In EG 202 057-4 [i.3], a successful data transmission is defined as successful if a test file is transmitted completely and with no error.
- **TV:** In ES 202 765-4 [i.5], a successful TV channel access is defined as an access where video and audio are accessible.

6.1.2 Definition of Units

- [6.1.2.1] The Service Provider shall use, when available, units that are part of the International System of Units as described in BIPM [2].
- [6.1.2.2] If no unit is defined in the International System of Units (e.g. bit, byte), a clear system of unit shall be defined and used consistently by Service Provider.
- [6.1.2.3] The Service Provider shall use Multiples and Submultiples (e.g. kilo = 1 x 1 000) that are part of the International System of Units as described in BIPM [2].

6.1.3 Definition of Time

- [6.1.3.1] The Service Provider shall define a clear and consistent reference for measuring time of an electronic communication. This method shall be unambiguous to all types of electronic communications delivered by the Service Provider (e.g. international roaming communications).

6.1.4 Definition of Duration

- [6.1.4.1] The Service Provider shall define a clear method to compute the duration of electronic communications charged to customers. The duration shall be determined as the difference of time between two well defined trigger points.

6.1.5 Definition of Data Volume

- [6.1.5.1] The Service Provider shall define a clear method to define volume of data exchanged during an electronic communication.

- [6.1.5.2] Volume metering method, defined in [6.1.5.1], shall define the way electronic communication is exchanged: upload, download, multicast, etc.
- [6.1.5.3] Volume metering method, defined in [6.1.5.2], shall define if protocol overhead information added on top of user information is included or not in the metering.

6.1.6 Definition of Classes of Service

- [6.1.6.1] If Service Provider markets different classes of service (e.g. based on throughput or availability), the Service Provider shall define a clear method to meter the parameter used to define each marketed class of service.

6.1.7 Definition of Rounding Methods

- [6.1.7.1] The Service Provider shall define the different methods used for rounding each type of raw parameters (time, duration, data volumes and classes of service).

6.2 Tariff Information Documentation

- [6.2.1] Tariff information published by the Service Provider shall be complete, unambiguous and accessible to customers and shall include or refer the metering principles of clause 6.1. The different modes of Tariff Information shall contain this information and shall be consistent.

6.2.1 Tariff Scope

- [6.2.1.1] Tariff information should cover all rate plans that are used by at least one customer. For the avoidance of doubt a rate plan that is still used by at least one customer shall be available, even if it is not sold any longer.
- [6.2.1.2] Tariff information shall state in an unambiguous way the pricing for each electronic communication type.
- [6.2.1.3] If an electronic communication price depends on the destination or the point of origin, tariff information shall explicitly state:
- the different types of domestic destinations;
 - the different types of international destinations;
 - the different types of roaming destinations.
- [6.2.1.4] If an electronic communication price depends on when it was generated, tariff information shall state without ambiguity the different periods of peak and off-peak hours and shall specify the applicable days of the week (including the case of bank holidays).
- [6.2.1.5] If an electronic communication price depends on technical profile used during the electronic communication generation, tariff information shall state without ambiguity the different types of technical profiles (for example with GPRS traffic: URL, APN, protocol nature, etc.) used for rating purposes.
- [6.2.1.6] Tariff Information shall define without ambiguity the applicable electronic communications that are included in buckets, their unit and how they impact the bucket balance.

6.2.2 Taxes Information

- [6.2.2.1] Tariff Information shall state if taxes are included or not in prices and which rate applies.

6.2.3 Definition of Rounding Methods

- [6.2.3.1] The Service Provider shall define the different methods used for rounding prices before and after the computation of taxes.

6.2.4 Definition of Publishing Modes

- [6.2.4.1] The Service Provider shall define the different publishing modes that are available for a customer of each tariff plan to access details about its billing information.

7 Checking-up Process

The checking-up process of the present document is based on the principle of using appropriate test subscriptions (SIM cards, fixed line, DSL lines, VoIP accounts, etc.) and on a network of automated robots to verify the compliance of a Service Provider with the billing integrity principles.

The automated robots use test subscriptions to generate electronic communications according to a predefined plan (the SSEC).

The Tariff Information published by the Service Provider for the test subscriptions is collected when available and checked, by verifying each charged item against a theoretical item computed on the basis of the robots logs, in a manner completely independent from the metering and billing systems of the Service Provider.

7.1 Process Overview

The process used for checking-up metering and billing is made of the elementary tasks described by figure 1.

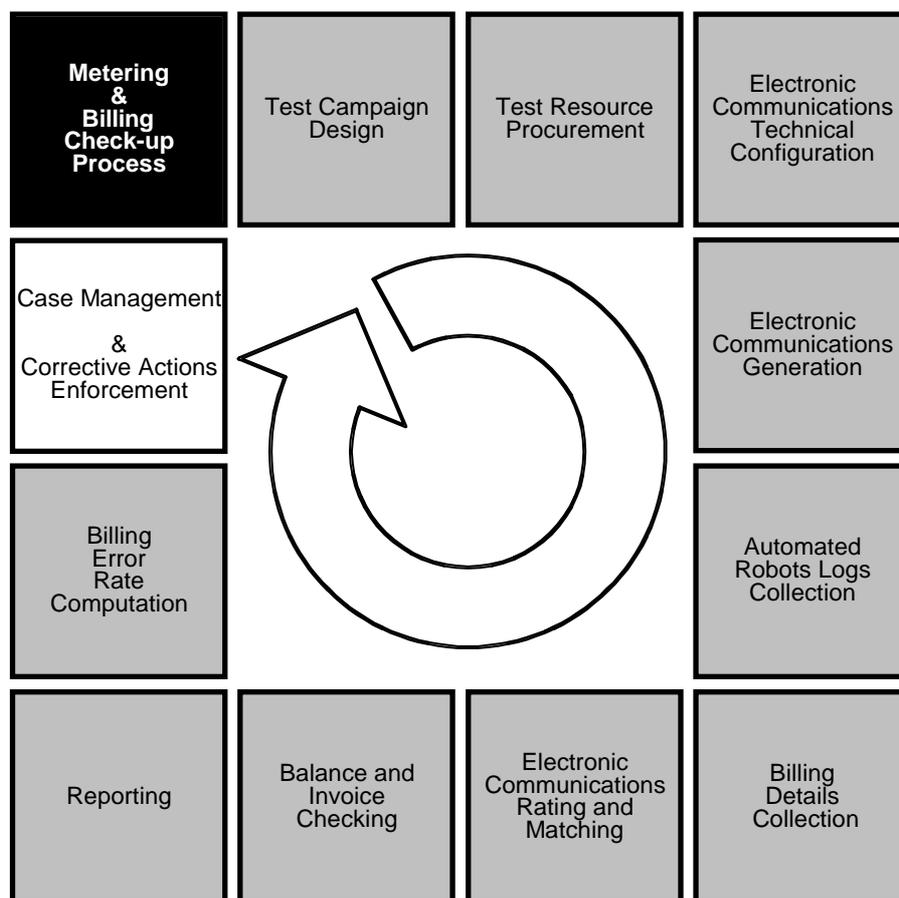


Figure 1: Checking-up Process Overview

Clauses 7.2 to 7.11 describe the clauses a Service Provider has to conform to, in order to claim compliance with the present document.

NOTE: The "Case Management and Corrective Actions Enforcement" is outside the scope of the present document which deals only with checking-up on metering and billing. Fixing errors is usually part of the whole process, since the checking-up on billing is usually performed to detect and fix issues. For the avoidance of doubt all clauses for this activity are provided in annex B.

7.2 Test Campaign Design

- [7.2.1] The Service Provider shall define a statistical method to design a SSEC that addresses metering and billing verification objectives and respects a set of testing constraints. An example of SSEC is provided in annex A.
- [7.2.2] The Service Provider shall document and validate the statistical method of [7.2.1].
- [7.2.3] The Service Provider shall use the statistical method to evolve the SSEC used for the billing and metering checking process on a Continuous Basis. The SSEC shall evolve at least on a predefined frequency that will be documented.

- [7.2.4] The SSEC shall involve a reasonable number of each electronic communication service types which can trigger a charging item by the Service Provider. The exact granularity of electronic communication types shall be defined by the Service Provider according to the statistical method (see also clause A.4).
- [7.2.5] The SSEC shall include at least one type of each offer type marketed by the Service Provider. The exact granularity of offer types shall be defined by the Service Provider according to the statistical method of 7.2.1.
- [7.2.6] The SSEC shall involve generation of electronic communications from the different locations types (switching zone, network geographic zones, etc.) available in the network of the Service Provider. The exact granularity of location types shall be defined by the Service Provider according to the statistical method of 7.2.1.
- [7.2.7] If the Service Provider offers to its customers the possibility to access services from other networks (e.g. roaming in the mobile world), the SSEC shall involve generation of electronic communications from a subset of the different networks accessible by the subscribers of the Service Provider. The exact granularity of networks shall be defined by the Service Provider according to the statistical method of 7.2.1.
- [7.2.8] The different target addresses (called number, URL, SMS recipient, etc.) of the SSEC shall be varied according to the statistical method of 7.2.1. For services that involve interconnection to reach a destination at another SP, the SSEC shall encompass diversity of possible terminating SP (including both off-net and international destinations).
- [7.2.9] The different start time of the SSEC shall be spread over the applicable period according to the statistical method of 7.2.1. The SSEC shall involve at least one electronic communication for each day of the year.
- [7.2.10] The different durations of the SSEC shall be varied according to the statistical method of 7.2.1.
- [7.2.11] The different volumes of the SSEC shall be varied according to the statistical method of 7.2.1.
- [7.2.12] The SSEC shall include contract lifecycle events like suspension, cancellation, address changes, etc. that may lead to billing errors.
- [7.2.13] The SSEC shall include any additional variation that reflects likely customer behaviour that may lead to billing errors.

7.3 Test Resources Procurement

- [7.3.1] The different test resources of the Service Provider (SIM cards, Fixed line, DSL subscription, VOIP Account, etc.) needed to perform the SSEC shall be configured in the networks and information systems of the Service Provider as if they were actual customers of the Service Provider.
- [7.3.2] The different test resources of other Service Providers (SIM cards, Fixed line, DSL subscription, VOIP Account, etc.) needed to perform the SSEC shall be procured in standard market conditions.

7.4 Electronic Communications Technical Configuration

- [7.4] The different electronic communications of the SSEC shall be updated on a Continuous Basis to a set of automated robots.

7.5 Electronic Communications Generation

- [7.5] The automated robots shall execute the electronic communications according to the predefined plan (SSEC) with an appropriate level of accuracy according to the Metering Principles defined in clause 6.1.

7.6 Automated Robots Logs Collection

- [7.6] The robots shall report about the executed electronic communications with an appropriate level of traceability.

7.7 Billing Details Collection

- [7.7.1] The SP shall publish Billing Details Information. For each publishing mode, the collection of Billing Details from the test resources shall be retrieved following the process used by actual customers wishing to know about their charging.
- For example, if the Service Provider offers a web site where customers can download their electronic invoices, the billing and metering checking process shall download the electronic invoices of the test resources in the web site. For the avoidance of doubt, a billing verification performed on the basis of more upstream information extracted directly from an internal information system (e.g. CDR of the network) should not be regarded as compliant with the present document.
- [7.7.2] Billing Details shall include electronic communication start time, duration or volume, destination (called party, SMS address, email address, URL, etc.) and any complementary data needed for the unique identification of the electronic communication.
- [7.7.3] Billing Details shall include price and, if applicable, the bucket impacted by each electronic communication.
- [7.7.4] In the case no publishing mode is available with sufficient details for some specific offer (e.g. prepaid data), a mechanism based on more upstream data should be set up to collect sufficient billing details so as to perform the rating and matching described in the following step of the billing and metering checking process.

7.8 Electronic Communications Rating and Matching

- [7.8.1] Electronic communications shall be re-rated (charged) on the basis of automated robot logs and according to published Tariff Information.
- [7.8.2] Electronic communications shall be re-rated (charged) in the chronological order of generation (i.e. after being sorted according to electronic communication start time).
- [7.8.3] Re-rated robots logs produced by the billing and metering checking process should be matched with the rating details produced by the network and information systems of the Service Provider.
- [7.8.4] The matching of [7.8.3] should be performed individually for each and all electronic communications.
- [7.8.5] In the case of an electronic communication yielding more than one bill item (e.g. a premium SMS that is billed through a content item and a transport item) each item of the robot logs should be matched with each item of the billing details.

7.9 Balance and Invoices checking

- [7.9.1] On the basis of the re rating and matching performed in the previous step, every discrepancy between the theoretical bill and the real bill shall be spotted for every electronic communication of the SSEC. A discrepancy may be:
- a missing invoice item;
 - an unexpected invoice item;
 - a discrepancy in time;
 - a discrepancy in duration;
 - a discrepancy in data volume;
 - a discrepancy in price before tax;
 - a discrepancy in price after tax;
 - wrong or missing tariff information.
- [7.9.2] Every discrepancy shall be analyzed through a contradictory process to ensure that the billing difference is an actual billing error and not an artefact.
- [7.9.3] The analysis shall be performed for each available publishing mode.

7.10 Reporting

- [7.10.1] Reporting about the billing and metering checking process shall be produced according to predefined templates.
- [7.10.2] The reporting shall indicate the different types of billing differences identified between the theoretical bill and the actual bill that have been identified (e.g. unbilled item, item billed twice, item billed with a wrong price, item billed with a wrong name, etc.) in the SSEC.
- [7.10.3] At least the following reports shall be produced for each applicable period:
- Report N°1: Detailed list of all executed electronic communications;
 - Report N°2: Detail list of all billing discrepancies;
 - Report N°3: Summary of billing discrepancies, in which similar discrepancies are grouped together.
- [7.10.4] Reports shall be archived during a period equal to the legal requirement of invoice archiving in the country of the Service Provider.

7.11 Billing Error Rate Computation

- [7.11.1] For each period (e.g. day, week, month, quarter) and for each types of electronic communications, the SP shall compute the Billing Error Rate as defined in the present document (see clause 3.1).

Annex A (informative): Example of a Stratified Sample of Electronic Communications

The SSEC of this annex is provided as an example for understanding of the requirements of the present document. This is especially targeted at explaining the requirements of clause 7.1 about the design of a SSEC.

The SSEC of this annex should be regarded as informative and not as a formal requirement of the present document. It is up to the management of the Service Providers to:

- select a statistical method to design a Stratified Sample of electronic communication that takes into account the probability of identifying billing differences while respecting a set of testing constraints;
- apply regularly this method to update the SSEC to be used by the billing and metering checking process.

The SSEC of this informative annex has been designed using a theoretical Service Provider, which has the following characteristics (the words and figures in brackets { } will be adapted for each Service Provider):

- The Service Provider is a {mobile operator} based in {Poland} offer {convergent} services.
- It has {10} millions customers that generates {60} electronic communications per {months}.
- It offers the following service types to its customers: {voice}, {SMS}, {MMS}, {email}, {Web access}, {TV channels}, {music download}, {movie download}.
- It operates {2G and 3G mobile} networks in {Germany}. The switching network is separated in {5} regional zones that are operated by {5} network regional operating centres.
- {It has roaming agreements with 400 other GSM operators. All roaming rates are broken down into 4 roaming zones with different prices}.
- It operates {DSL} networks and sells {"access boxes"} that allow a fixed access to Internet.
- It markets {20} prepaid mobile offers, {30} residential postpaid mobile offers and {10} Enterprise mobile postpaid offers and {5} convergent access box offer.

The SSEC is described in the following dimensions:

- Locations;
- Networks;
- Offers;
- Services;
- Durations;
- Volumes;
- Spreading;
- Additional Variations.

A.1 Locations

The SSEC should involve the generation of electronic communications in {5} cities in {Poland} ({1} in each regional zones):

- {Warszawa}
- Lodz
- Krakow
- Wroclaw
- Poznan}

The SSEC should involve the generation of electronic communications in {6} countries in roaming ({3} top countries in zone 1, {1} top country of each other zone):

- {Germany}
- France
- Italy
- USA
- Russia
- Egypt}

The method for a statistical distribution of locations described in EG 202 765-2 [i.4] could be used.

A.2 Networks

In {Poland}, the SSEC should involve the {GSM, GPRS and 3G} networks.

In each of the {6} foreign countries, the SSEC should involve {all VPLMN that are open for roaming}.

A.3 Offers

The SSEC should involve the {65} offers marketed.

NOTE: This means that {60} SIM cards and {5} DSL lines of the Service Providers have to be provided.

A.4 Services

The SSEC should include the following services for {mobile} subscriptions.

Table A.1

Services	Number of electronic communications per day in SSEC
Voice call to on-net destinations	500
Voice call to VPN destinations	50
Voice call to all mobile networks in Germany (see note)	300
Voice call to major fixed networks in Germany (see note)	100
Voice call to international destinations (50 countries) (see note)	50
Voice call to premium services (08xx)	50
SMS to on net-destinations	200
SMS to all mobile networks in Germany (see note)	100
SMS to international networks (50 countries) (see note)	50
SMS to premium services (short number)	50
MMS to on net-destinations	20
MMS to all mobile networks in Germany (see note)	10
MMS to international networks (10 countries) (see note)	10
MMS to premium services (short number)	10
Email	50
Web browsing session	100
TV reception	10
Movie download	10
Music Download	10
NOTE: This means that appropriate test resources of these operators have to be procured for the conduction of the billing and metering checking process.	

A.5 Durations

In the SSEC, durations of electronic communications charged on a duration basis {voice call, TV on mobile} should include the durations detailed given in table A.2.

Table A.2

Durations
5 seconds
30 seconds
1 minute
2 minutes
5 minutes
30 minutes
1 hour
2 hours

A.6 Volumes

In the SSEC, volumes of electronic communications charged on a duration basis {Web, MMS} should include the volumes detailed in table A.3.

Table A.3

Volumes
5 kilobyte
50 kilobyte
200 kilobyte
1 Megabyte
10 Megabyte

A.7 Spreading

The electronic communications of the SSEC should be equally spread across the different offers.

The electronic communications of the SSEC should be generated at 80 % from the {German} network and 20 % from the roaming networks.

The electronic communications of the SSEC should be equally spread across the different locations.

The electronic communications of the SSEC should be equally spread across the different networks.

The electronic communications start times of the SSEC should be equally spread over the day.

The electronic communications durations of the SSEC should be randomized so as to cover the maximum types of different durations.

The electronic communications volumes of the SSEC should be randomized so as to cover the maximum types of different volumes.

A.8 Additional Variations

The postpaid offers of the SSEC should be spread across the {12} different bill cycles of the postpaid offers.

The prepaid offers of the SSEC should be spread across the {2} different IN platforms.

The subscriptions used for the SSEC should receive a tariff changes every {3} months.

Annex B (informative): Case Management & Corrective Actions Enforcement

This annex provides guidance for Service Providers implementing "Case Management & Corrective Actions Enforcement" when "billing differences rate" shows the need to enhance the metering and billing process.

- B.1 Billing errors identified by the billing and metering checking process should go through a formal Case Management process agreed with the management of the Service Provider, in order to enhance the process.
- B.2 The Case Management process should include the necessary steps to perform billing differences verification, impact analysis, correction design and correction planning so as to warrant that corrective actions are enforced within the right network components and information systems.
- B.3 The efficiency of the Case Management process should be reviewed on a recurrent basis (e.g. once a year) so as to review number of errors detected, number of billing errors corrected and other appropriate performance indicators.
- B.4 The Service Provider should correct the billing errors detected by the billing and metering checking process within the service level agreed with management.
- B.5 The Service Level Agreement for billing differences corrections should be documented and reviewed on a regular basis (e.g. once a year).
- B.6 The SSEC should include any additional variation that is considered necessary by the Service Provider to lead to the detection of potential billing errors.

History

Document history		
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