ETSI TS 102 845 V2.0.0 (2018-10)

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

Reference
RTS/USER-0050

Keywords
charging, quality, user

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

Contents

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

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 ETSI TR 102 847 [i.7].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The original motivation to produce present document was that a significant difference rate between theoretical and actual bills had been identified by several parties in the current metering and billing processes operated by Service Providers (operators). 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.

The telecommunications industry remains a fast-moving and complex ecosystem. The Service Providers are facing a number of new challenges:

- Smart phone as fast-growing User platform to access applications and all digital services over mobile internet.
- Rapidly evolving new technologies, combining 5G and optical fibres, for migrating ultra-high speed networks.
- An underlying shift taking place: telecom providers are investing in media and content services, while media and content service providers are investing in communications.
- Over-the-top (OTT) services becomes increasingly popular with Users, who demand higher-quality data services and essentially increased traffic requirements on Service Providers.

The convergence of telecom services with media and technologies makes **revenue assurance** for Service Providers as a necessary strategy with many potential opportunities for the substantial amounts of data flowing through their networks by data propositions, pricing and charging mechanisms, in addition to the existing voice and SMS revenues. On the other hand, those challenges increase the risks of billing errors and cause overcharging or undercharging for the Service providers. From the User or Regulator view, overcharging and transparency in a bill are of paramount importance.

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 of service improvement on 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. Therefore, the present document is inevitable not only for protecting User, for assuring revenues of Service Provider, but also for Regulatory Authority in monitoring accuracy of all charges of consumers when using the regulated services.

The purpose of ETSI TS 102 846 [1] is to define when, how and by whom the conformity assessment audit is 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 and the test methodology 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

2.1 Normative 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 referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://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.

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)".

[3] ETSI TS 122 115: "Technical Specification Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Service aspects; Charging and billing (3GPP TS 22.115)".

[4] ETSI TS 132 240: "Technical Specification Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Charging management; Charging architecture and principles (3GPP TS 32.240)".

[5] ETSI TS 132 260: "Technical Specification Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging (3GPP TS 32.260)".

[6] ETSI TS 132 295: "Technical Specification Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Charging management; Charging Data Record (CDR) transfer (3GPP TS 32.295)".

[7] ETSI TS 132 297: "Technical Specification Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer (3GPP TS 32.297)".

[8] IEEE 802.11™-2012: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications".

2.2 Informative 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 referenced document (including any amendments) applies.

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

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.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.

[i.8] ETSI ETR 037: "Network Aspects (NA); Telecommunications Management Network (TMN); Objectives, principles, concepts and reference configurations".

3 Definitions of terms and abbreviations

3.1 Terms

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

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

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).

Charging Data Record (CDR): Record generated by a Core Network Element for the purpose of billing a subscriber for the provided service. It includes fields identifying the user, the session and the Network Elements as well as information on the network resources and services used to support a subscriber session.

NOTE 1: In the traditional circuit domain, CDR has been used to denote "Call Detail Record", which is subsumed by "Charging Data Record" hereafter [5].

NOTE 2: For each party to be charged for parts of or all charges of a chargeable event a separate CDR is generated, i.e. more than one CDR may be generated for a single chargeable event, e.g. because of its long duration, or because more than one charged party is to be charged.

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

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, volume, 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 should 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.

Test Charging Generator (TCG): Remotely operated and automated test system that is able to generate test events, emulating the usage of application transactions, each type of services, including voice, messaging, value added services (VAS) and data, etc. The test events, in turn, cause the core networks to generate and collect the corresponding appropriate charging information and transfer it to the billing systems.

NOTE 1: TCG used to denote Test Call Generator in the CS domain. More recently, the term of test Event Generation System (EGS) is also used in the same context of TCG. In the present document, TCG subsumes the term of automated (test) robot in the earlier versions.

NOTE 2: Its main functions comprise:

- electronic communication test planning;
- electronic communication test events generation and execution;
- electronic communication logging as test result.

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:

5G	Fifth Generation mobile technology
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
APN	Access Point Name
BIPM	International Bureau of Weights and Measures/Bureau International des Poids et Mesures
BVB	Billing Verification Body
CDR	Charging Data Record
CSCF	Call Session Control Function
DSL	Digital Subscriber Line
EGS	Event Generation System
FDD	Frequency Division Duplex
GPRS	General Packet Radio Service (2G mobile technology together with GSM)
GSM	Global System for Mobile communications
GW	GateWay

ICT	Information and Communications Technology
IN	Intelligent Network
IP	Internet Protocol
ISUP	ISDN User Part
LTE	Long Term Evolution (4G mobile technology)
MMS	Multimedia Message Service
MNO	Mobile Network Operator
MSC	Mobile Switching Centre
NR	New Radio access
OCS	Online Charging System
OTT	Over-The-Top
RCS	Rich Communication Services
SCEF	Service Capabilities Exposure Function
SGSN	Serving GPRS Support Node
SIM	Subscriber Identification Module
SIP	Session Initiation Protocol
SMS	Short Message Service
SP	Service Provider
SSEC	Stratified Sample of Electronic Communications
TCG	Test Charging Generator
TDD	Time Division Duplex
TV	Television
UE	User Equipment
UMTS	Universal Mobile Telecommunications System (3G mobile technology)
URL	Universal Resource Locator
USSD	Unstructured Supplementary Service Data
VAS	Value-Added Service
VOD	Video On Demand
VoIP	Voice over IP
VPLMN	Visited Public Land Mobile Network
VPN	Virtual Private Network

4 Billing Chain and Risks

4.1 Billing Chain

A telecommunication billing chain consists of three functional areas:

- information management area,
- operational area,
- financial management area.

The information management area is responsible for customer information, pricing model and numerous billing configurations, management of the contract entries and the corresponding service provisions and withdrawals, customer cares.

The operational area captures, collects and records the overall usage of services, resources (creating raw CDR, ETSI TS 122 115 [3], ETSI TS 132 240 [4] and ETSI TS 132 260 [5]), processes, converts and transfers CDR, from raw CDR, mediated CDR, rated CDR to billed CDR, ETSI TS 132 295 [6] and ETSI TS 132 297 [7]. The area comprises online charging and offline charging and billing.

The financial management area covers financial functions such as invoice (bill) production, revenue recognition, accounts receivable and payment tracking, as well as processing, mapping correspondence between payments and consumed services, managing credits and debt collections, calculating company taxes, etc.