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Universal Mobile Telecommunications System (UMTS);  
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Charging and billing  
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# 1 Scope

The present document describes the Service Aspects of charging and billing of the 3GPP System.

The present document is not intended to duplicate existing standards or standards being developed by other groups on these topics, and will reference these where appropriate. The present document will elaborate on the charging requirements described in the Charging Principles in 3GPP TS 22.101 Service Principles. It will allow the generation of accurate charging information to be used in the commercial and contractual relationships between the parties concerned.

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 22.101: "Service aspects; Service Principles".
- [2] 3GPP TS 22.066: "Support of Mobile Number Portability (MNP)".
- [3] 3GPP TS 22.234: "Requirements for 3GPP system to wireless local area network (WLAN) interworking".
- [4] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
- [5] 3GPP TS 22.086: "Advice of Charge (AoC) supplementary services"
- [6] ETS 300 178: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information at call set-up time (AOC-S) supplementary service; Service description"
- [7] ETS 300 179: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information during the call (AOC-D) supplementary service; Service description"
- [8] ETS 300 180: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information at the end of the call (AOC-E) supplementary service; Service description"
- [9] TS 183 047: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN IMS Supplementary Services; Advice Of Charge (AOC)"
- [10] TS 183 058: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); SIP Transfer of IP Multimedia Service Tariff Information; Protocol specification"
- [11] void
- [12] 3GPP TS 22.220, "Service requirements for Home NodeBs and Home eNodeBs"
- [13] 3GPP TS 22.278, "Service requirements for the Evolved Packet System (EPS)"
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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the definitions in [4] are supplemented by the following definitions:

**Prepay service:** A prepay service allows a subscriber to pay in advance for the use of specific services, the prepay account may be updated each time the subscriber uses the services related to that account.

**Real time:** Time, typically in number of seconds, to perform the on-line mechanism used for fraud control and cost control.

**Session:** logical connection between parties involved in a packet switched based communication This term is used for IP connections rather than the term "call" that is normally used for a connection over conventional (circuit switched) systems.

**Note:** Information about charging is typically collected in Charging Data Records (CDR).

**Local Charging Zone (LCZ):** A logical grouping of a number of cells, where a special tariff applies for a select group of users. A network may have a number of LCZs. A LCZ does not necessarily need to be aligned with an LA or RA, i.e. the border of LCZ may not be the border of an LA or RA.

## 3.2 Abbreviations

For the purposes of the present document the definition of abbreviations in [4] apply.

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# 4 Main Requirements and High Level Principles

The main new requirements for 3GPP system charging and accounting are:

- to provide charging information for all charges incurred and requiring settlement between the different commercial roles;
- to allow fraud control by the Home Environment and the Serving network;
- to allow cost control by the charged party;
- to provide at the beginning of a chargeable event an indication to the charged party (if involved in the chargeable event) of the charges to be levied for this event;
- to allow itemised billing for all services charged to each subscription, including voice and data calls, and services offered by home environments;
- to enable the Home environment to provide a Prepay Service and to enable the serving network to support that Prepay Service for the Home environment's subscribers;
- to allow interconnect (inter-operator) charging including mobile/fixed operator to mobile/fixed operator (circuit switched & IP), and mobile/fixed operator to IP network provider; and mobile/fixed operator to I-WLAN operator;
- to allow Network operator to 3<sup>rd</sup> party supplier (e.g. Value Added Service Provider) charging;
- to provide details required for Customer Care purposes;
- to support the shared network architecture so that end users can be appropriately charged for their usage of the shared network, and network sharing partners can be allocated their share of the costs of the shared network resources.

The high level principles that will guide the charging requirements are summarised as follows:

- It shall be possible to charge separately for each type of medium used (e.g. voice, video, data) in a session and for each service used (e.g. voice call, streaming video, file download);
- It shall be possible to charge for different levels of QoS applied for and/or allocated during a session for each type of medium or service used;
- It shall be possible to charge each "leg" of a session separately. This includes the incoming and outgoing legs and any forwarded/redirected legs. (Note: The legs mentioned here are logical legs, i.e. not necessarily identical to actual signal and traffic flow. Even though tromboning may be avoided by optimal routing, the operator should still be able to charge for the 'virtual legs' of the call);



- It shall be possible to charge unsuccessful calls and sessions (e.g. for billing purposes, to provide the user a full documentation of his call attempts);
- The user can be charged according to the service used irrespective of the technology used to deliver it. (That is, the charge is not derived from whether 2G or 3G is used);
- The user can be charged according to the technology used to deliver a service. (That is, different charges can be applied on 2G and 3G);
- It shall be possible to charge a user according to the network resources used. For example, if a large bandwidth is required to use high quality video, the user could be charged accordingly. This is related to charging by QoS;
- It shall be possible to charge users flexibly for the use of extra resources (in at least the same network) for all legs of the call. For example, if a video component is added to a voice call the use of extra radio resource at both ends of the call could be paid for by each user in the call or totally by the initiating user;
- It shall be possible to suppress charging for certain types of connection e.g. when a customer receives tones or network announcements or during sessions such as automated pre-pay top-up;
- It shall be possible to apply different charging based on tariff information provided by a 3<sup>rd</sup> party. This tariff information may change during the use of the service (e.g. based on menu selection in a voice response menu). In this case the requirement applies both for customer-charging and interconnect-charging;
- It shall be possible for the home network to charge its customers while roaming in the same ways as when they are at home. For example, if duration based charging is used for charging for streaming music in the home network, then it shall be possible to apply the same principle when the user is roaming;
- It shall be possible for operators to have the option to apply charging mechanisms that are used in GSM/GPRS. For example for duration of a voice call, for the amount of data transmitted (eg for streaming, file download, browsing) and for an event (one-off charge);
- It shall be possible for a network operator to charge its users for activities while roaming so that the home network will get the capability to raise service charges depending on the roamed to network, e.g. because of inter operator charges for the use of service capabilities within the visited network which will in general depend on the serving network. The ability to supply all the necessary information for all the charging options will depend on the capability of the visited network. For service capabilities which are provided by the home network, however, it is required that the charging information is collected to allow to identify the serving network of the served subscriber;
- It shall be possible for charging to be applied based on location, presence, push services etc.;
- The network may provide information to the UE so that the UE is able to notify and indicate to the user the LCZs it is in. This allows the user to decide whether to accept/originate the service depending on the LCZs they are in;
- It shall be possible to charge using pre-pay, post-pay, advice of charge, 3<sup>rd</sup> party charging techniques;
- It shall be possible for the home network to apply different tariffs to national calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on whether or not the called subscriber's Home PLMN equals the calling subscriber's Home PLMN, rather than on the called subscriber's MSISDN;

Note: This distinction is necessary only in the case, where the called subscriber's MSISDN may have been ported by Mobile Number Portability.

- For circuit switched interconnection only a capability is required to collect information regarding user rate and user protocol at the interconnection point so that e.g. the identification of CS video telephony at the interconnection point for inter-network accounting purposes becomes possible.

These new requirements and principles will allow users more freedom to obtain service when roaming, whilst providing effective cost and credit control for the Home Environment and User.

## 4.1 Cross Phase Compatibility

Where possible (e.g. services already defined within earlier releases), the charging information collected shall be consistent with the information already provided

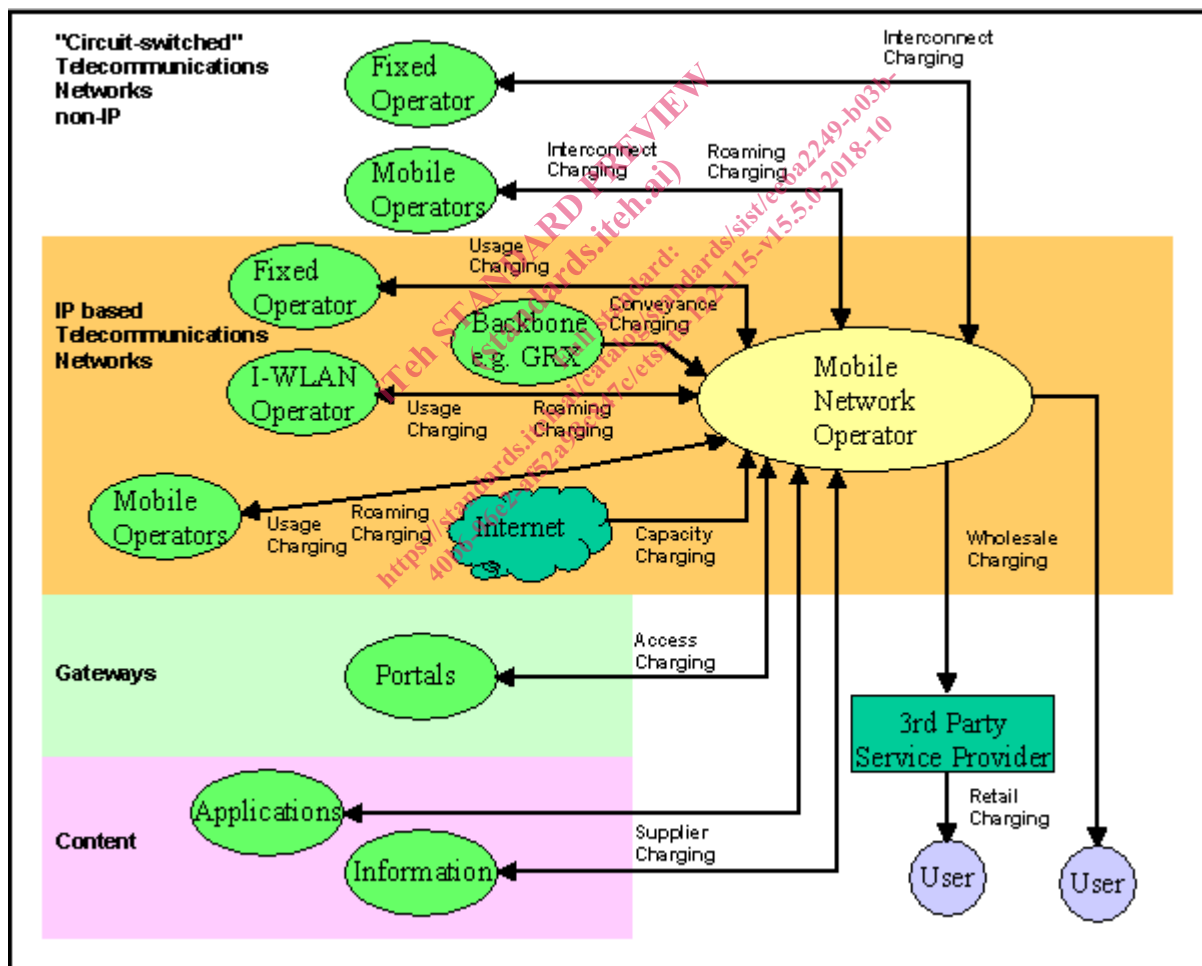
It is envisaged that 3GPP system will evolve beyond this Release with the addition of a number of new requirements for charging and billing, for example with the addition of a number of new requirements for charging and billing; these are noted in the appropriate sections below. The technical standards for each release should be developed in such a way that it is possible and practical to introduce these requirements, ideally in a backward compatible manner.

Note: When a change is introduced which affects the 3GPP technical standards, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

## 4.2 Charging Entity Relationships

In the process of introduction of the all-IP technology there will be a mixture of different types of entities using different types of technology.

The diagram below shows the different entities involved in charging and their relationships.



The types of entities and the relevant type of charging as shown on the diagram are as follows:

- **Users:** retail charged by Mobile Network Operator or 3<sup>rd</sup> Party Service Provider.
- **3<sup>rd</sup> Party Service Providers:** wholesale charged by Mobile Network Operator.

- **Other telecommunications operators:** interconnect charging between Mobile Network Operator and non-IP "circuit-switched" Network Operators for call traffic carried; usage charging between Mobile Network Operator and IP-based Network Operators for session traffic carried.
- **Other mobile operators:** roaming charging between these entities, this may require different mechanisms for IP-based types from the traditional "circuit-switched" types. Also, where mobile operators need to pass traffic to one another, there will be interconnect charging for non-IP "circuit switched" types; usage charging for IP-based types.
- **I-WLAN operators:** where I-WLAN operators need to pass traffic to mobile operators or mobile operators to I-WLAN operators, there may be roaming and usage charging.
- **IP backbone carriers:** conveyance charging Mobile Network Operators for traffic carried.
- **3<sup>rd</sup> Party content & application suppliers:** supplier charging between Mobile Network Operators and Value Added Service Providers for information exchanged.
- **3<sup>rd</sup> Party Portals:** access charging between Mobile Network Operators and this entity.
- **Internet:** charge for capacity of connection between Mobile Network Operator and Internet. An Operator pays a provider for a connection based on capacity, e.g. annual charge for a 2Mbit/s "pipe".

## 4.3 Charging guidelines for IP-Multimedia services

### 4.3.1 User Charging Requirements

This section describes the options required for the charging of end users. The network operator could charge users directly (retail charging) or charge a 3<sup>rd</sup> party service provider (wholesale charging). These requirements can therefore apply to retail and wholesale charging. Note that the word "session" is used to describe the connection between a user and either another user or a service. This term is used for IP connections rather than the term "call" that is normally used for a connection over conventional (circuit switched) systems.

The various ways that users can establish sessions and the main components are described. Also, the required charging options are specified.

#### 4.3.1.1 Session End Point Configurations

A variety of different connection configurations are possible for IP multi-media independently of the components of the session being used. It should be possible to charge for the following types of sessions with the options identified. These charging options should be applicable to each medium separately. Note that not all the charging options need to be used and that some of the options can be used only if the particular party is using the resources of IMS:

The table below lists some example session scenarios and describes some of the possible charging options for each scenario. The table does not list all possible session scenarios nor does it list all possible charging options for the scenarios. Rather, the intent of the table is to emphasize the numerous charging options that shall be supported by an IP Multimedia System due to the complexity of sessions possible. The charging options shall adequately account for all session resources used in order to enable the operators to apply flexible billing policies and to satisfy regional and/or national regulatory policies.

In general, any session shall allow for the following charging options:

- To apply the "Calling Party Pays" charging principle;
- A 3<sup>rd</sup> party to be charged for all or part of the session;
- Split charging between any of the parties, including 3<sup>rd</sup> parties;
- Session setup and session resources to have different charging rules. Different rules would be applied for example, in a scenario where **A** calls an advertising number, say **B**. **B** could be a web-based toy advertisement number, for example. In this scenario, **A** could pay for the initiation fee (session setup), and **B** could pay for the session resource.
- Any party can add another media to the current session in progress and any of the parties (not necessarily the one(s) being charged for the current session) can be charged for the additional media. For example, **A** calls **B** and **A** is