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Internet Protocol (IP) based networks; Parameters and mechanisms for charging

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Technical Report

Internet Protocol (IP) based networks; Parameters and mechanisms for charging

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Contents

Intellectual Property Rights.....	4
Foreword	4
Introduction	4
1 Scope.....	5
2 References.....	5
3 Definitions and abbreviations	6
3.1 Definitions	6
3.2 Abbreviations.....	8
4 Reference Configuration	8
4.1 Network aspect	8
4.2 Charging reference model	10
4.3 Service Aspect	12
5 Charging principles applied to IP based networks.....	13
6 Parameters relevant for charging in IP based networks	14
6.1 List of parameters	14
6.2 Description of the parameters	16
7 Charging mechanisms required in IP based networks.....	19
Annex A (informative): Example of a charging record	20
Annex B (informative): Example of a charging record using MPLS	21
Annex C (informative): Reference Implementation.....	24
Bibliography	25
History	26

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

Introduction

ETSI has already established an ETSI Technical Report on **Parameters and Mechanism for Charging in ATM based Networks**, see ETR 123 [1], produced by former ETSI STC NA5. With the emergence of IP and the trend to use IP not only for the "best effort" service as it is done today, the question on how to charge such diverse services emerges.

With the background of the work done for ETR 123 [1] the follow up body of ETSI STC NA5, the ETSI WG SPAN8 (formerly NA8) has to prepare a comparable document for IP based services.

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1 Scope

The present document gives guidance in selecting charging parameters and the appropriate charging mechanisms in the IP (Internet Protocol) based networks of the future.

In the today's Internet there is no detailed collection of charges implemented. Users are charged by the Internet Service Provider (ISP) either:

- a flat rate;
- a time dependent rate; or
- a volume class dependent rate.

In addition the telecommunication service to access the ISP is charged by the Telecommunication Network Operator.

Such charging schemes will persist but with the emergence of the Internet - especially with the evolution towards commercial operation - the need arises to collect charging information for diverse services. These charges may be composed of various parameters and components according to the service split among several operators. The present document concentrates on such cases only where parameters are collected.

Therefore, the present document describes a first set of parameters relevant for charging and the mechanisms needed for collection of charging information in IP based networks. The general principles for charging are listed which apply to IP based networks. These parameters are applicable to all types of IP based services. Nevertheless an appropriate set of parameters can be selected for each type.

Collection of charging information will be done both by network operators and service providers for the usage of resources. The present document describes parameters and mechanisms from a technical point of view. Therefore, the term "operator" is used throughout the present document where it is applicable to service providers, to network operators, or to both service providers and network operators.

Accounting, tariffing and billing of IP based services are outside the scope of the present document. Nevertheless these issues are also of great interest for IP based networks and services. Accounting (or settlement) is currently discussed in ITU-T Study Group 3 and for the Internet Telephony Service in ETSI Project TIPHON.

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETR 123: "Broadband Integrated Services Digital Network (B-ISDN); Parameters and mechanisms provided by the network relevant for charging in B-ISDN".
- [2] TR 101 619: "Network Aspects (NA): Considerations on network mechanisms for charging and revenue accounting".
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3 Definitions and abbreviations

3.1 Definitions

Many definitions relevant for the present document are already contained in ETSI TR 101 619 [2]. The most important ones are repeated here.

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

Accounting: revenue sharing amongst operators.

NOTE 1: Also known as "settlement" and "revenue accounting".

Billing: process of transferring the stored charging information for a user into a bill. [TR 101 619 [2]]

Charging: the determination of the charge units to be assigned to the service utilization (i.e. the usage of chargeable related elements). [TR 101 619 [2]]

Content provider: entity which offers information to the user.

Flow: unidirectional communication relation from one user to another user dedicated to and established for the transfer of data belonging to one service and one interaction, started by a trigger and terminated by the end of the data transfer or an interruption (e.g. transfer of a file via ftp).

NOTE 2: The flow start time is the time when the first packet is sent. The flow ends if no more packets are sent for a pre-defined time interval (maximum allowed flow idle time). (See also IntServ Flow.)

IntServ Flow: unidirectional flow of IP packets for which in an IntServ (RSVP) reservation is valid.

NOTE 3: Since RSVP allows senders to share a reservation (resource) a flow can have multiple source addresses (one flow per session). For unicast sessions or if a distinct reservation is made, the flow has only one sender. An IntServ flow is defined by its source address(es), optional source port, destination address and destination port [15].

Metering: The measurement of "components" which can be used for charging such as the duration of the call. In the present document named also "collection of charging information".

Network charging capabilities: a set of procedures performed by the network elements in order to determine all the parameters of one communication session, which are required for assessing the effort provided by the network, and to determine the values of these parameters.

Network layer service: the provision of resources by the network for the transmission of data.

NOTE 4: To provide services above the best effort delivery the mechanisms of the Integrated Services or the Differentiated Services Model can be used.

Network Operator: entity which is operating a public telecommunication network. If local networks are operated the network operator can provide access for subscribers and users. [TR 101 619 [2]]

Pricing: the correlation between "money" and "goods" or "service".

NOTE 5: The term is not generally used in telecommunications, the usual term being "tariffing".

Service provider: entity that can provide a service to a user having established a call by a network operator. The network operator may be the service provider. [TR 101 619 [2]]

Phase: period within a session in which the traffic characteristics do not change.

NOTE 6: A new phase is entered if the reservation parameters are renegotiated.

NOTE 7: If a session can consist of multiple flows, the traffic characterization can be different for each flow. A phase specifies a period of a session or a period of a flow. Since charging parameters (like price per time unit or length of a measurement interval) can depend on the time of day, the entering of a new time period (e.g. business hours) might be also considered as the entering of a new phase.

Revenue accounting: technical process of accounting the collected revenue for joint service provision to a group of users and distributing it to the interworking and/or co-operating service/network providers. [TR 101 619 [2]]

RSVP session: session (data flow) defined by destination address (unicast or multicast), optionally destination port number and the protocol ID of the transport-layer protocol [4].

NOTE 8: For multicast communication a destination port is not mandatory. For unicast communication a destination port number should be specified in order to distinguish several unicast sessions to the same hosts.

Service: That which is traded by a provider.

Service subscriber: entity, i.e. a user-identity, which subscribes to a service offered by the service provider.

Session: communication relation between one user and another or other users, characterized by a clearly defined starting point and a clear defined termination point (e.g. login and logout - see also RSVP session definition).

NOTE 9: An internet session could be seen as when a connection is opened between an email reader and a POP3 email server or when a user dials up an ISP in order to browse the WWW. More complicated sessions are for example multiparty interactive video conference over a broadband internet. The key point regarding a session, from the perspective of charging, is that it provides an opportunity for use coupled with start and end points in order to create a billable event.

Tariff: charged price per usage element or per group of usage elements. [TR 101 619 [2]]

Tariffing: determination of the prices to be applied for services and service elements. [TR 101 619 [2]]

User: entity which actually uses a service.

3.2 Abbreviations

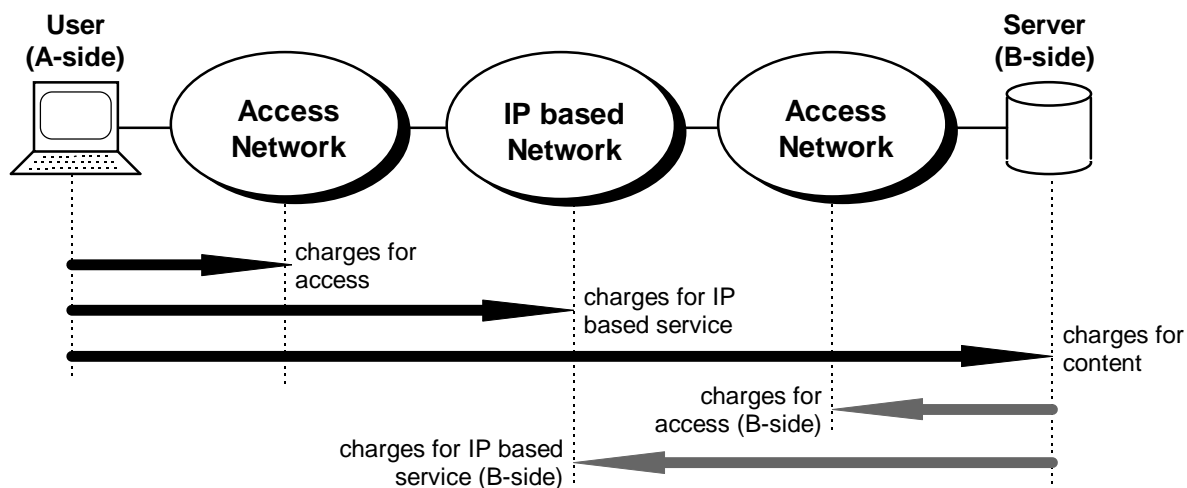
For the purposes of the present document, the following abbreviations apply:

ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
CL	Connectionless
DIFFSERV	Differentiated services
DS	Differentiated Services (field)
ID	Identification
IntServ	Integrated services
IP	Internet Protocol
ISP	Internet Service Provider
MAN	Metropolitan Area Network
MIB	Management Information Base
MPLS	Multi Protocol Label Switching
N-ISDN	Narrowband Integrated Services Digital Network
OS	Operations System
PHB	Per Hop Behaviours
POP3	Post Office Protocol, Version 3
QOS	Quality of Service
R	Router
RSVP	Resource Reservation Protocol
RTFM	Real Time Flow Measurement
RTP	Real-Time Transport Protocol
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SRL	Simple Ruleset Language
SW	Switching System
TOS	Type of Service (field)
TR	Technical Report
WWW	World Wide Web
XC	Cross Connect

4 Reference Configuration

4.1 Network aspect

Figure 1 shows the reference configuration of the network the further considerations are based on as well as the flow of charges. It consists of an Access Network to the IP based network and the IP based network itself.

**NOTES:**

One operator might operate more than one of the networks shown.

The shown networks might consist of a concatenation of several networks of the same type.

The server is shown to represent the usual usage of the Internet. It might also be a second user.

The B-side can also be a gateway in case of "Internet Telephony".

Figure 1: Reference configuration and charges

The user is charged for several components of his communication (which are usually provided by several operators) such as:

- charges for the **content** (to be paid to the content providers);
- charges for the **access** to the network (to be paid to the access network operator);
- charges for the **IP based service** (to be paid to the operator of the IP based network).

There might be other components and other operators/providers. The present document concentrates only on the third component: the IP based network (the third bullet).

Usually each of the above mentioned networks is composed of several networks operating on different layers. This principle is shown in Figure 2.