Agenda Item: 9.4.1

Source: Telecom Italia Mobile

Title: CR to 22.15

Document for: Approval

CHANGE REQUEST No :	**A001**	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM	22.15	Version:	3.00

Submitted to SMG		for approval	without presentation ("non-strategic")	**X**
list SMG plenary meeting no. here ↑		for information	With presentation ("strategic")	

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

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Proposed change affects: SIM ☐ ME **X** Network **X**
(at least one should be marked with an X)

Work item:	UMTS Charging and Billing
Source:	Telecom Italia Mobile **Date:** 04/03/99
Subject:	Transfer of text from 22.24 into 22.15

Category:

(one category and one release only shall be marked with an X)

				Release:		
F	Correction				Phase 2	
A	Corresponds to a correction in an earlier release				Release 96	
B	Addition of feature				Release 97	
C	Functional modification of feature		**X**		Release 98	
D	Editorial modification		**X**		Release 99	**X**

Reason for change:	Besides editorial modifications, some additional text coming from the 22.24 has been included into this specification in order to clarify the concept of charging control mechanisms.

Clauses affected: Various

Other specs affected:

Other releases of same spec		→ List of CRs:	
Other core specifications		→ List of CRs:	
MS test specifications / TBRs		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

UMTS 22.15 V3.0.0 (1999-0

Universal Mobile Telecommunications System (UMTS); Service aspects; Charging and Billing (UMTS 22.15 version 3.0.0) Approved at SMG#28

UMTS

Universal Mobile

Telecommunications System
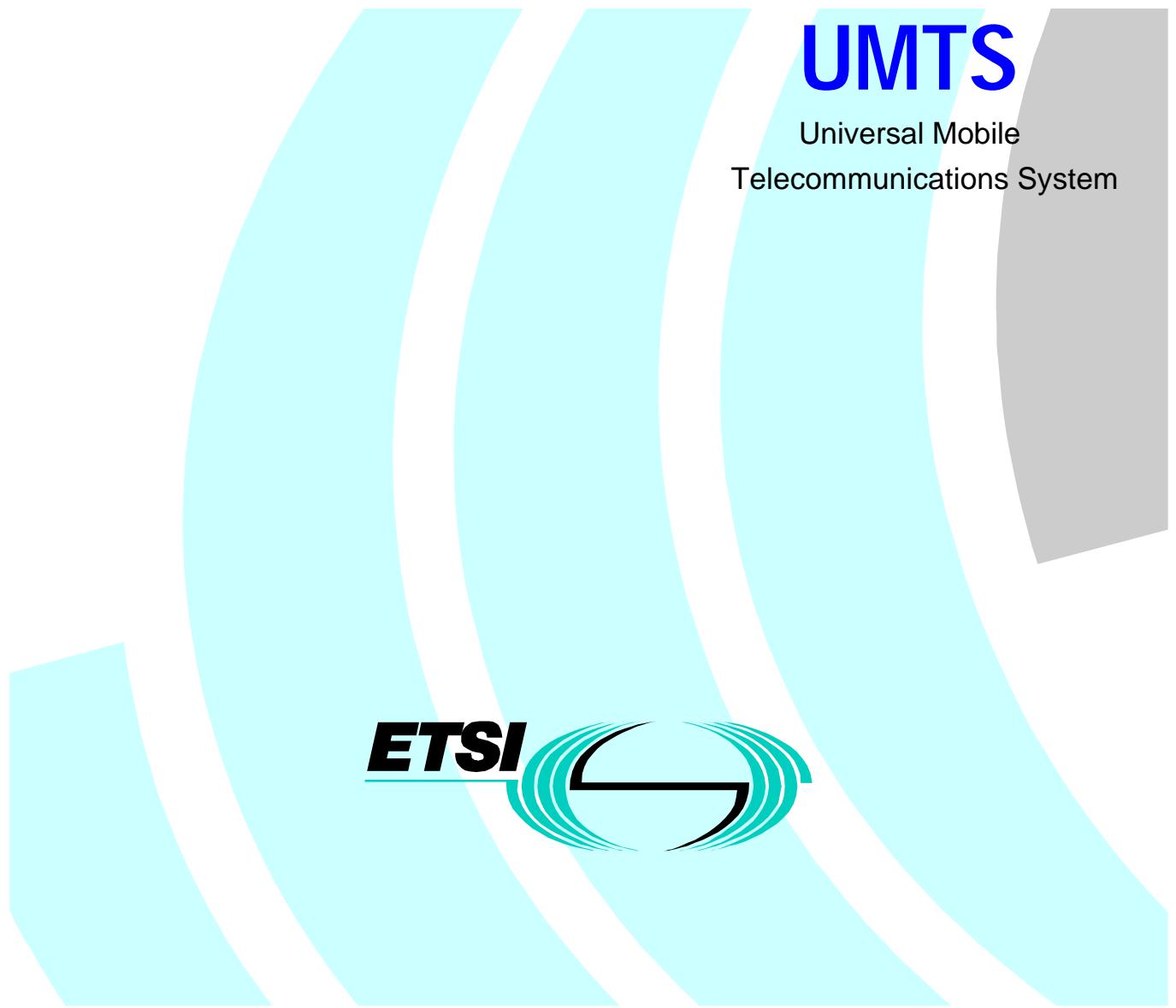
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Contents

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Foreword

This draft Technical Specification has been produced by the Special Mobile Group (SMG) Technical Committee of the European Telecommunications Standards Institute (ETSI).

The contents of this TS is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of this TS, it will be re-released by SMG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x   the first digit:

    1   presented to SMG for information;

    2   presented to SMG for approval;

    3   Indicates SMG approved UMTS document.

y   the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

z   the third digit is incremented when editorial only changes have been incorporated in the specification;

1   Scope

This ETSI Technical Specification describes the Service Aspects of charging and billing of the Universal Mobile Telecommunications System (UMTS).

This standard is not intended to duplicate existing standards or standards being developed by other groups on these topics, and will reference these where appropriate. This standard will elaborate on the charging requirements described in the Charging Principles in UMTS 22.01 Service Principles. It will allow the generation of accurate charging information to be used in the commercial and contractual relationships between the parties concerned.

The tariffing method which a Serving Network uses, and the commercial basis on which charges for the services used are levied to the Home Environment are outside the scope of the standard.

2   Normative references

References may be made to:

   a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

   b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

   c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

   d) publications without mention of a specific version, in which case 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]   ~~DTS/SMG-012201U, 1996: "Service Aspects; Service Principles (UMTS)";~~ETSI TS 22.01 "Service aspects; Service Principles"

3   Definitions and abbreviations

3.1   Definitions

For the purposes of this TS, the definitions in [1] are supplemented by the following definitions:

Accounting: The process of apportioning charges between the Home Environment, Serving Network and User.

Billing: A function whereby CDRs generated by the charging function are transformed into bills requiring payment.

Call Detail Record (CDR): A 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. For each party to be charged for parts of or all charges of a chargeable event a separate CDR shall be 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.

Chargeable Event: An activity utilising telecommunications network infrastructure and related services for user to user communication (e.g. a single call, a data communication session or a short message), or for user to network communication (e.g. service profile administration), or for inter-network communication (e.g. transferring calls, signalling, or short messages), which the network operator wants to charge for. The cost of a chargeable event may cover the cost of sending, transporting, delivery and storage. The cost of call related signalling may also be included.

Charged Party: A user involved in a chargeable event who has to pay parts or the whole charges of the chargeable event, or a third party paying the charges caused by one or all users involved in the chargeable event, or a network operator.

Charging: A function whereby information related to a chargeable event is formatted and transferred in order to make it possible to determine usage for which the charged party may be billed.

Charging session: the period after which the serving network has to ask a new authorization to the Home Environment because the charging limit for a particular user has been reached

Settlement: Payment of amounts resulting from the accounting process.

3.2 Abbreviations

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

CDR   Call Detail Record

4 Requirements

The main new requirements for UMTS charging and accounting are:

- to provide a call detail record for all charges incurred and requiring settlement between the different commercial roles;

- to allow fraud control by the Home Environment and cost control by the User by providing CDRs to the Home Environment at short notice.

- to allow cost control based on a charge limit per user or per subscription.;

- 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 allow the flexible definition of tariffing principles and commercial offers (e.g. pre-paid services)

   - to allow the provisioning of detailed information for customer care purposes

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

5 Generation of Call Detail Records

The standard shall support the creation and transfer of charging records in order to facilitate:

- interworking with pre-UMTS systems (e.g. GSM);

- fraud management procedures;

- detailed itemised billing;

- introduction of operator specific charging schemes

5.1 Call Detail Record Requirements

Call Detail Records shall be generated in the Serving Network to record chargeable User or Mobile Station activity and inter-carrier connections. Some of the information is provided by the user, other information is only available in the network element of the serving network.

Depending on the type of chargeable event some of the information may not be available or might not be required.

5.1.1 Information provided by the user

The user incurring the charge shall provide the following information to the serving network:

- User identity used for authentication;

- Home environment identity;

- Terminal Identity and Terminal Class;

- Destination endpoint identifier for service requested (e.g. B number);

- Resource requested (e.g. bandwidth, connectionless);

- QoS parameters (e.g. maximum delay).

5.1.2 Information provided by the serving network

The serving network serving the user shall provide the following information to the home environment:

- All of the information listed in section above (Information provided by the user);

- Serving network identity;

- Recording network element identity;

- Universal Time (UT) at which the service request was initiated;

- Universal Time (UT) at which resources were provided for the service;

- Resource allocated to the user;

- Quantity of data transferred by the user;

- QoS provided to the user;

- Location of the user (definition of location is required) ;

- whether GSM Optimal Routing was applied;

- If IN or CAMEL services were applied, the service parameters and the actually used destination number and calling party number identification;

- Time duration covered by this call record to an accuracy of at least 1 second;

- Charge accumulated for this call <u>in the currency of the serving network</u>.

- Unique identity of the chargeable event which allows the billing system to correlate all records belonging to the same chargeable event;

- Unique CDR identity (unique per network element in a period of about 100 days).

5.1.3 Charged Party

For subscription related chargeable events the CDR shall indicate the charged party, i.e. normally the calling party. As alternative it should be possible to apply reverse charging or to charge the event to a party not involved in the event itself (e.g. a company as VPN subscriber). It should be possible for multiple leg calls (e.g. forwarded, conference or roamed) to be charged to each party as if each leg was separately initiated. However, in certain types of call, the originating party may wish/be obliged to pay for other legs (e.g. SMS MO may also pay for the MT leg.).

Provision shall be made for the chargeable party to be changed during the life of the call.

In case of inter-network chargeable events, the CDR usually does not contain the charged party, but it can be derived from network configuration information contained in the CDR.

For each party to be charged for a chargeable event or parts of it a separate CDR shall be generated.

5.2 Special Cases

5.2.1 Long calls

The advent of packet data calls, which can extend for very long periods of time (days, weeks etc), although at low cost because charges are based on data throughput, may mean that billing records are only output at the end of very long periods. This may require call records to be generated mid-call, either when some charge value is reached or some duration or both, to allow for both charging settlement and cost control.

5.2.2 Multimedia calls

During one call the user may invoke different services like speech, data transmission, video and audio, each leading to a separate CDR. The Unique identity of the chargeable event in each CDR shall allow the billing system to correlate these records and to indicate to the user on the bill that they belonged to one call.

5.2.3 E-Commerce

The UMTS system may be used to trade soft goods (e.g. information, video, audio), or hard goods (e.g. books) of high or low value per item between the user and a merchant. It shall be possible for such merchants to charge users directly for services they provide. Electronic payment mechanisms are or shall be made available through other standards (micropayment, credit card payment, etc), and therefore are outside the scope of this specification. UMTS shall not prohibit the use of these mechanisms, and, where possible, shall provide the basic communications transport to allow them to be used effectively.

However, if the serving network acts as merchant of soft goods, it may charge the user directly, creating a CDR as described above or using micropayment mechanisms.

6 Transfer of Charging Information

The Serving Network is responsible for generating charging records and forwarding them to the Home Environment for settlement.

The efficient transfer of charging information between serving networks and from serving networks to home environments requires a standardised interface between these entities. Transfer of charging information between serving network and home environment shall be done at the following times:

- when a chargeable event occurs

- when a chargeable event is initiated by the user

-       when a chargeable event is initiated by the user

-       when a chargeable event terminates

-       at regular intervals during a chargeable event

The format of the charging information exchanged (see 5.1) shall be standardised. It shall be possible for the relevant parties to agree minimum and maximum age of call information transferred between themselves.

These charging records sent to the Home Environment must itemise every chargeable event incurred. They are used to calculate the user's bill and provide itemised billing to the user. They also act as the basis for settlement between the Home Environment and Serving Network.

The charging records may be passed via a third party (clearing house), which could provide currency conversion and credit control between the Home Environment and different Serving Networks. However, these latter functions are outside the scope of standardisation.

It shall be possible to establish a mechanism allowing the on-line transfer of charging information between the serving network and the home environment This could be used by the Home Environment as the fallback mechanism when the charging algorithm cannot be downloaded into the serving network (section 7.1)

6.1   Integrity, Secrecy and Validation of Content and Receipt of Charging Information

The transmission mechanism for charging information collected in 5.1 above shall ensure its integrity and secrecy.

A mechanism to validate the source and integrity of the information shall be provided so that:

-   The home environment shall be able to validate the source and integrity of the charging information supplied by the serving network;

-   The serving network shall be able to validate the source and integrity of the charging information supplied by the user;

-   The serving network shall have proof that services were provided to a specified user.

7   ~~Accounting and Settlement~~

~~The serving network shall collect and process the charging data generated in its network elements. The record of each individual transaction shall be reported to the home environment at short notice in order to provide itemised bills, and to deal with any disputes regarding charges both for users and for other UMTS networks and home environment.~~

7   Charging control mechanisms

7.1   Delegation of charging authority

The registration process allows the home environment to authenticate users before they incur any charges. Once authenticated, the home environment then delegates authority to the serving network operator with which he has a direct commercial relationship to incur charges for services supplied to that user up to a limit.

The serving network shall have the possibility to download a charging control algorithm from the Home Environment. This algorithm is used during the calls to control the user's charges and causes a revalidation when the charge limit has been reached.

Once a charging session is finished, the Home Environment has to authorise a new charging delegation for the next charging session. The system should be designed such that authorisation for new charges is obtained before the expiry of the previous charge limit.

The generation of call records is independent from the duration or cost of charging sessions.

The service logic execution environment shall be standardised to allow the same charge control logic to operate identically in different networks. The charge control logic shall have access to all relevant parameters to allow it to determine charges in real time, including time of day, number dialled, bearer(s) used, data transferred and Quality of Service achieved.

The direct commercial relationship may be with either the serving network operator if known directly by the home environment or a network operator known to the home environment. This procedure uses each network as trusted third parties in a chain of delegation between entities, thus allowing commercial transactions between entities who have no direct commercial dealings. There shall be an authentication procedure between all entities in the UMTS system which have a commercial relationship.

7.2 Fraud Control ~~and Cost Control~~

Mechanisms shall be provided which allow fraud control by the serving networks and the home environment~~, and shall allow cost control by the user~~.

7.2.1 Fraud Control by the Home Environment

Charging information shall be collected by the home environment in short time intervals from all serving networks which its users are allowed to use. The billing system in the home environment shall process the information in real time and provide the means to set charge thresholds per time interval upon which some actions may be started, such as informing the customer care centre or even barring the user in the HLR.

7.2.2 Fraud Control by the Serving Network

Charging information shall be collected from the network elements and processed in short time intervals. This will allow the serving network to always be aware of the exposure to visitors. A limit for the accumulated charges for all visitors from one home environment or a limit per visitor may be agreed between the home environment and the serving network.

7.~~2.~~3 Cost Control by the User

Mechanisms shall be provided which allow cost control by the user.

7. ~~2.~~3.1 Charging Limit

The user shall be able to set in his home environment a limit for the accumulated charges per time interval. Upon exceeding this limit or prior to incurring a charge which would exceed the limit, certain actions may be desired by the user:

- notification to the user, requesting to extend the limit, or

- HLR barring allowing no further originating calls, or

- HLR barring cancelling the roaming permission.

7. ~~2.~~3.2   ~~Advice of Charge~~Charging control

A mechanism shall be standardised providing an indication to the chargeable party (if involved in the chargeable event) of the charges to be levied for a chargeable event. This mechanism shall be able to handle all possible charging scenarios, and all services and tariff variants that a home environment may offer to the user.

The charge control mechanism can be downloaded from the Home Environment to the terminal equipment/USIM: this mechanism may work on the same principles of the mechanism defined above for network control purposes.

These cost control mechanisms may not allow precise real-time status of current charges, but will be able to provide at least a maximum charge exposure.

~~7.3~~8   Inter-network Settlement

Mechanisms shall also be provided to allow inter-network settlement of charges on a bulk basis. The same mechanisms shall be used between home environments and serving networks. This will allow each of these parties to meter the total input and output of charges and thus determine the payments required on a periodic basis between each of the parties with which they directly interact. The mechanisms used shall allow each of the parties to meter charge flows independently, with the aim of matching the values recorded at both sides of the same interface. The imbalance in charge flow shall be accumulated in real-time, such that each entity can be informed when a threshold has been exceeded and determine whether to continue.

The tariffing method which a Serving Network uses, and the commercial basis on which charges for the services used are levied to the Home Environment are outside the scope of the standard.

~~7.4   E-Commerce~~

~~The UMTS system may be used to trade soft goods (e.g. information, video, audio), or hard goods (e.g. books) of high or low value per item between the user and a merchant. It shall be possible for such merchants to charge users directly for services they provide. Electronic payment mechanisms are or shall be made available through other standards (micropayment, credit card payment, etc), and therefore are outside the scope of this specification UMTS shall not prohibit the use of these mechanisms, and, where possible, shall provide the basic communications transport to allow them to be used effectively.~~

~~However, if the serving network acts as merchant of soft goods, it may charge the user directly, creating a CDR as described above or using micropayment mechanisms.~~

~~8~~9   Automatic Roaming Agreements

It is a requirement that UMTS users shall be able to obtain service and use chargeable services with networks with whom neither they nor their home environment have any direct commercial agreement. This shall be enabled by interworking via trusted third parties. Each Home Environment shall interwork with one or more serving network operators, with whom they would negotiate a commercial roaming agreement and test the interworking. Any user wishing to use the services of a particular serving network would register with that serving network, who would either directly or indirectly interwork with the home environment. Real-time online billing mechanisms would be used to ensure that charges incurred for UMTS services do not exceed the credit limits set. This would be applied for the user and the other roles involved in commercial dealings. In practice, any serving network shall be capable of operating as a roaming broker.
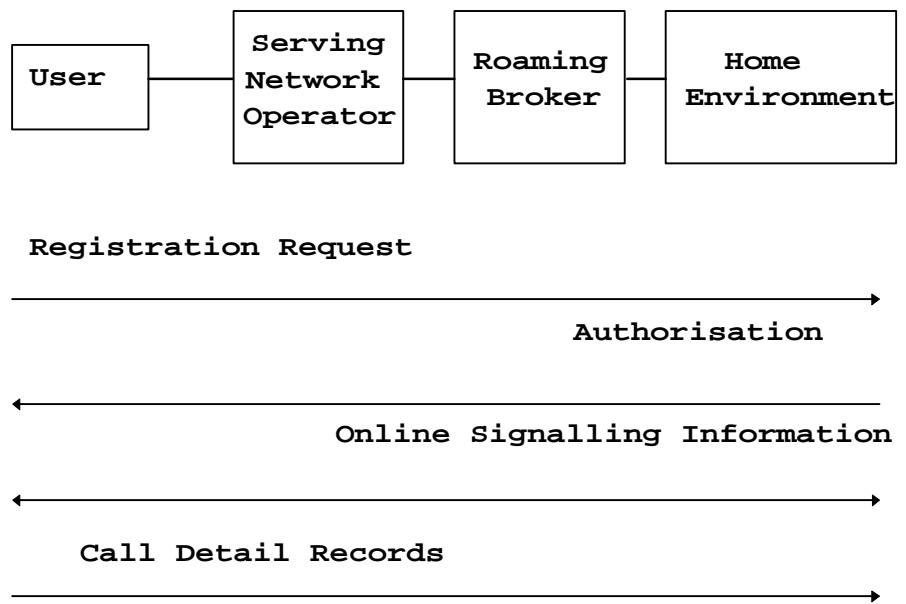
Figure 1: Registration and Roaming Process

~~There are two key aspects which are required to allow such a system to be deployed:~~

> ~~How does the serving network operator know how to route the registration request?~~

> ~~How does each party in the transaction charge for their services?~~

Roaming via third parties should not affect the on-line charging control mechanisms defined in the sections above for the scenario where there is a direct relationship between the Serving Network and the Home Environment.

~~8~~9.1   Routing the Registration Request

The same mechanisms used for routing calls and resolving addresses shall be used to route the subscription identity back to its Home Environment . Clearly, some form of routing identification will be required to allow a serving network, which does not maintain its own list of all known HE, to determine the appropriate route to reach a given HE. A number of alternative routes may be possible, and ideally the system should be capable of determining the lowest cost to the end user.

Typically, smaller networks will only have a limited number of external connections to other networks or clearing houses, but may not know which one to use for an unknown (new) HE. In this case, the serving network may make a number of inquiries for each route to determine the lowest cost route to handle the call.

~~8~~9.2   Settlement of charges

Settlement of charges incurred by a user shall be on a wholesale basis between the different parties involved in the registration link. By authorising a user to register, or a roaming broker to pass that on, each party is in turn authorising charges up to a maximum credit limit with the adjacent party. Any charges levied can then be paid to the adjacent party on a wholesale basis at the end of a mutually agreed accounting period. Funds are thus passed between each party for the services supplied by the network operator in a serial fashion.

History

Document history		
Date	**Status**	**Comment**
27 August 1996	Version 0.0.1	SMG 1 WPC output draft for editing purposes only
3 February 1997	Version 0.0.3	Presented to SMG1 WPC meeting, London Incorporated changes agreed at Dec 96 Meeting including charging model and charge enquiry
20 April 1997	Version 0.0.4	Presented to SMG1 WPC meeting in Sophia Antipolis Incorporated text submitted at Feb 97 meeting
4 June 1997	Version 1.0.0	Proposed Version 1 incorporating changes discussed at SMG1 WPC meeting in Antwerps, June 97
23 June 1997	Version 1.0.2	Incorporated remaining changes discussed at SMG1 WPC meeting in Antwerps, June 97
27 Nov 1997	Version 1.1.0	Preparation for SMG1 UMTS Helsinki meeting, incorporating text from reports 22.24 and 22.71
4 Dec 1997	Version 1.2.0	Incorporated comments from 22.24, 22.71 developed at SMG1 UMTS Meeting in Helsinki
8 Dec 1997	Version 1.2.2	Format and editorial changes by ETSI Sec for SMG#24
5 November 1998	Version 1.3.0	Incorporate changes discussed at SMG1 Rome, including reflecting changes to 22.01 role model.
12 January 1999	Version 1.3.1	Accept Changes and send to editing SMG1 Rome Tdoc 98-0859 Agreed by correspondence. Reviewed by Rapporteur Jan 13, 1999
27 January	Version 2.0.0	To be presented at SMG#28 for Approval
Feb 99	Version 3.0.0	Apporved at SMG#28