Charging Requirements

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Open Mobile Alliance

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Contents

Figures

Tables

1. Scope (Informative)

This Requirement Document (RD) contains market driven, interoperable charging requirements for OMA defined mobile service enablers. This document captures the overall charging needs on mobile service enablers, from the perspective of service subscriber, user, mobile network operator, service provider, application provider and content provider. The information contained in this RD is applicable to service providers (i.e. network operators), application/content developers and infrastructure/terminal manufacturers.

The Use Cases in this document illustrate the market need for the various charging principles that requires support from mobile service enablers's interworking charging capabilities.

In scope:

- Charging functionality requirements across the various service enablers, capturing device, clients, service platforms, connectivity and content.

- Requirements to facilitate event / time / session / subscription charging for each service type (communications, content and applications).

- Requirements to support online and offline charging methods (i.e. prepay and postpay payment methods), real-time charging and mechanisms for 'A' party pays.

- Requirements for charging interfaces between content provider, service provider and mobile operator.

- Requirements for the management of charging events, which are closely related to identification, authorisation and security mechanisms.

Out of scope:

Billing and payment is outside the scope of this Work Item.

2. References

2.1 Normative References

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt

OMA-Dictionary- V2_0_0-20040225-A] "Dictionary for the OMA specifications", Open Mobile Alliance URL:http://www.openmobilealliance.org

2.2 Informative References

[3GPP TS 21.905 *"Vocabulary for 3GPP Specifications (Release 6)", 3GPP, March 2004, TS 21.905,*

URL:http://www.3gpp.org

[3GPP TS 22.115] *"Service aspects;Charging and billing (Release 6)", 3GPP, March 2004, TS 22.115, URL:http://www.3gpp.org*

[3GPP TS 23.125] *"Overall high level functionality and architecture impacts of flow based charging; Stage 2 (Release 6)", 3GPP, June 2004, TS 23.125, URL:http://www.3gpp.org*

[3GPP TS 32.240] *"Charging management; Charging Architecture and Principles(Release 6)", 3GPP, December 2003, TS 32.240, URL:http://www.3gpp.org*

[3GPP TS 32.250] *"Circuit Switched (CS) domain charging (Release 6)", 3GPP, March 2003, TS 32.250, URL:http://www.3gpp.org*

[3GPP TS 32.251] *"Charging management; Packet Switched (PS) domain charging (Release 6)", 3GPP, September 2003, TS 32.251, URL:http://www.3gpp.org*

[3GPP TS 32.252] *"Telecommunication management; Charging Management; Wireless Local Area Network (WLAN) charging; (Release 6)", 3GPP, TS 32.252, April 2004, URL:http://www.3gpp.org*

[3GPP TS 32.260] *"Charging management; IP Multimedia Subsystem (IMS) charging (Release 6)", 3GPP, TS 32.260, March 2004, URL:http://www.3gpp.org*

[3GPP2 X.S0013-007- 0] *"IP Multimedia Subsystem - Charging Architecture". 3GPP2, X.S0013-007-0, December 2003, URL:http://www.3gpp2.org*

[3GPP2 X.S0013-008- 0] *"IP Multimedia Subsystem - Accounting Information Flows and Protocol", 3GPP2, X.S0013- 0008-0, December 2003, URL:http://www.3gpp2.org*

3. Terminology and Conventions

3.1   Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except "Scope" and "Introduction", are normative, unless they are explicitly indicated to be informative.

3.2   Definitions

3rd party	A merchant involved in the delivery of a service apart from the network operator
Accounting	OMA: The process of apportioning charges between actors
	Note: 3GPP2's definition of the term "accounting" is aligned with OMA's definition of the term "charging"
	See "3GPP2-X-P0011,cdma2000® Wireless IP Network" in 3GPP2
Advice of Charge	Real-time display of the network utilisation charges incurred by the User Equipment. (3GPP TS 21.905)
Agnostic Charging Entity	An entity providing charging capabilities. The definition of this entity will be changed in future phases as the architecture for charging is defined
Billable event	An event on the billing system that is susceptible of being billed. One billable event does not necessarily have to be related to one or several charging events
Billing System	The system used for receiving charges and generating the bill
Bundle service	A service composed of a combination of other services sold as a whole
Charging Data Record	A data record that contains information about a service for use in billing and accounting. It will typically include all the information needed for calculating charges and describe the service and the involved parties
Chargeable Event	OMA: A service delivery that has taken place or will take place, and can be specified and recorded. 3GPP: 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), or for mobility (e.g. roaming or inter-system handover), 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. (3GPP TS 21.905)
Charged Party	The entity responsible for the payment of the chargeable events
Cross-discounting	The reduction of the price associated to one or several services due to the usage of another service or services
Discount	A reduction in the usual price of a service
Funds	Value which can be exchanged for goods or services
Home Environment	.See definition in [3GPP TS 21.905].
Interconnection	The technical physical connection between two networks (GSMA BA 273221)
Invoice	A list of items provided or work done together with their cost, for payment at a later time
Mobile device	A personal communication device (e.g. PDA, mobile phone etc) capable of communicating either locally (e.g. using Bluetooth) or through a network (e.g. GSM or CDMA)
Non-recurring Charge (one-time charge)	Charges that are applied only once independent of usage (i.e. activation, equipment purchases)
Payment	It is the process by which customer presents the merchant with transaction credentials, as a response to the transaction details, which is sufficient for the merchant to agree to provide the customer with the goods and/or services

Payment Association	The entity which governs, that is, defines the interfaces and rules for a payment system
Payment Credentials	This is the credentials that the customer gets from the issuer that allows the customer to make use of the payment system
Payment System	Each of the systems that enables the different types of payment
Payment Transaction	The presentation of the Transaction Details to the customer and the response of Transaction Credentials to the merchant
Price	The amount of money (funds) for which a service is sold
Promotion	Special Discount applied to promote a service. A promotion is a discount whose reduction in the usual price may change (from one user to another, from one time to another...) use to stimulate market demand or improve product availability. Examples include coupons, discounts, contests, etc
Rating	The process of determining prices or tariffs for a given service based on service parameters, subscriber and subscription parameters and external parameters like time of day
Recurring Charge	Predetermined charges that are applied in a regular basis independent of the usage, associated with a service or product. (i.e. access fees, account maintenance fees)
Refund	Reimbursement to the customer for previous charges of a service
Retail Tariff	A tariff used by Service Providers for billing subscribers
Rollback	Recover to an earlier state
Reservation	An arrangement of quota for a particular purpose or time
Settlement	Transfer of funds or adjustment of an account
Service Leg	The part of the service that is uniquely related to a user
Service Provider	A Service Provider is an entity that provides services to a subscriber 3GPP: A Service Provider is either a network operator or an other entity that provides services to a subscriber (3GPP TS 21.905)
Session	A series of interactions between two communication end points that occur during the span of a single connection or service delivery
Session Charging	Method performing subsequent charging requests during delivery of a service
Tariff	A scheme that determines service price from various factors such as event, time, date, etc (e.g. x€/min)
Termination Charge	A charge set by the destination administration/ROA for terminating incoming traffic regardless of origin. (ITU-T D.000)
Transaction Credentials	A function of the payment credentials, the transaction details, and authentication of the customer, that contains sufficient information for the merchant, acquirer and issuer to process the payment
Transaction Details	A description of the transaction, it includes for example the price, description of goods and the merchant's name
Usage Charges	Charges based on service use, usually proportional to it

3.3   Abbreviations

3GPP	3rd Generation Partnership Project
3GPP2	3rd Generation Partnership Project 2
AAA	Authorization, Authentication and Accounting
ACE	Agnostic Charging Entity
HLFR	High Level Functional Requirements
IP	Internet Protocol
I&E	Information and Entertainment
ITU	International Communication Union

MMS	Multimedia Messaging Service
MNO	Mobile Network Operator
NO	Network Operator
OMA	Open Mobile Alliance
PIN	Personal Identification Number
SMS	Short Message Service
TPSP	Third Party Service Provider
OMA	Open Mobile Alliance

4. Introduction   (Informative)

Traditionally, services for telecommunications networks and the network itself were once tightly coupled. The process to create a new service would imply standardisation of all the steps in the service delivery, including the network capabilities, the user experience and the interoperability issues. In that situation, the introduction of a new service had to be done via Standards bodies, a slow and at times difficult task for Operators to differentiate themselves with their competitors.

As the mobile market evolves, it becomes ever more complex. With the introduction of IP in the network and the possibilities to offer services on top of it, this approach has changed. Today, there exists the possibility of creating a new service and include it in the network in a really quick manner. If we want to maintain the high service levels that have been achieved in the industry, there are some problems that have to be solved for each one in an efficient way, most of them related to the relationship with the customer (customer care) and the way the charges are applied for the services.

However new parties may become part of the value chain. Content aggregators, content providers, m-commerce financial entities etc, will need a framework that allows them to get some money out of the value chain without cannibalising revenues from other parts of it. Different business models should be allowed simultaneously for different entrants, and it is important that time to market is not increased because of the lack of a common understanding of the service. We can take as an example the interoperability issues at the beginning of the MMS service.

Although the user is becoming the key factor in the business, there is a threat that the user interests could be harmed because of a lack of ability to offer appealing services with suitable charging conditions The perceived value can be originated in different ways, so flexibility is a must in the future charging environment. In addition to charging based on time or volume, new elements based on events and content will become increasingly important.

The user is also becoming more and more a central part of the service itself. While in the past a service was designed for a specific segment of the market, in the near future it will be possible that different identities and devices are used by the same user in different environments. For that reason - and although market segmentation will go on - the relationship between the user and the segments will be more complex, with users that can be considered "Home" during their free time but will use their devices to access "Business" content while they are working. The same can be said about the relationship between the user and the terminal, which possibly won't remain as "one-by-one". This could also lead to an environment where the user does not know what is the set of services available to him in a particular environment and what charges would be applied for them, so it is important that the user is able to customise the service environment, know in advance the charges that he is going to be applied and be sure that only the services asked will be billed. On the other hand, there should be mechanisms to avoid fraud throughout the value chain.

While setting up requirements for every service is not feasible, due to the fact that charging requirements are often tightly related to the service itself, there is a necessity for a common view on the necessities of service delivery for charging. A minimum set of common (i.e. general) requirements is needed to facilitate the interworking and interconnection of new services without mandating the way those services are developed and allowing a broad set of business models to be used. This minimum requirement set will allow new business models to be deployed in a compatible way.

As an example, the following factors should be considered:

- The 3G services environment is becoming very dynamic, where many providers with very different applications and services appear and disappear quickly in trying to meet the changing market requirements as soon as possible. Thus a charging system that can provide all business actors a very simple way to interact, and allowing greater flexibility in their business models, is needed.

- There will be different levels of trust between the different actors involved in the service delivery. The charging system should not assume that a strong trust between parties will always exist.

- Multi Operator scenarios should be considered, including the possibility for a service provider to offer services to several network operators, services roaming across operators, etc.

- A charging architecture needs to be able to support not only legacy charging types, like "time" or "event", but new charging types such as "value" or content based charging. Additionally, there will appear complex charging models for the end user which could include special promotions, cross promotions, prizes, special rates for services roaming situations, subscriptions etc.

- The tariff applied to the customer should be kept as simple as possible; no matter how complex are the new services.

- Several means of payment for each service could be allowed, independent of the client type. This is normally known as the convergence of prepay and postpay. This convergence can be done on different levels. First, users are separated into prepay or postpay users as they are today, while the same services are offered to both groups. Second, users will be able to choose the method as payment of each service. In that scenario, prepay and postpay will be considered only payment types.

- It's absolutely mandatory to protect the user from being charged for a service not requested. We have to protect user against fraud, possible malfunction of applications etc.

- In general, fraud should be avoided by performing the necessary application/user/operation validation etc.

- Due to the complexity of the charges to be applied for new services, Operators should be able to advise the user of the charges that are going to be levied before the service is delivered. That information can be informative when the user is notified of the information, or intrusive, when acceptance of the charges must be done for the service to be delivered.

- Service delivery should be made equally available to the customer independently on the means of payment used

5. Use Cases   (Informative)

5.1   Use Case TPSP, WAP Push Service

Affected Areas				
Device	Connectivity	Enabling Services	Applications	Content
X	X			X

Tickmarks (X)
Additional Keywords

Table 1: Affected Areas for WAP Push Service

5.1.1   Short Description

This scenario describes one Push service related to three parties(the user who ordered it, the receiver and the service provider). The data records (whether real time or not real-time charging) of the charging enabler should specify which party will pay for it. The charging information should at least include the service provider's identifier and the service identifier, and the originator for PUSH service and the PUSH service receiver and the party paying for it.

5.1.2   Actors

- End user

- (Mobile) Network Operator

- Service Provider

- Agnostic Charging Entity (ACE), like the Mobile Network Operator's billing system

5.1.2.1   Actor Specific Issues

None known

5.1.2.2   Actor Specific Benefits

None known

5.1.3   Pre-conditions

- The terminal supports browsing

- The terminal supports PUSH

- The ACE is able to bill for the service.

- The Service Provider has a business relation with Payment Provider

- The Service Provider can push messages into the mobile terminals

5.1.4   Post-conditions

A billing record has been placed on the ACE's billing system. There shall be settlements among each actor. The Service provider will be paid by the Agnostic Charging Entity.

5.1.5   Normal Flow

Today is Rose's birthday. Her friend Jack wants to send her an e-greeting card to her handset. The architecture for that service would be as the follow picture:
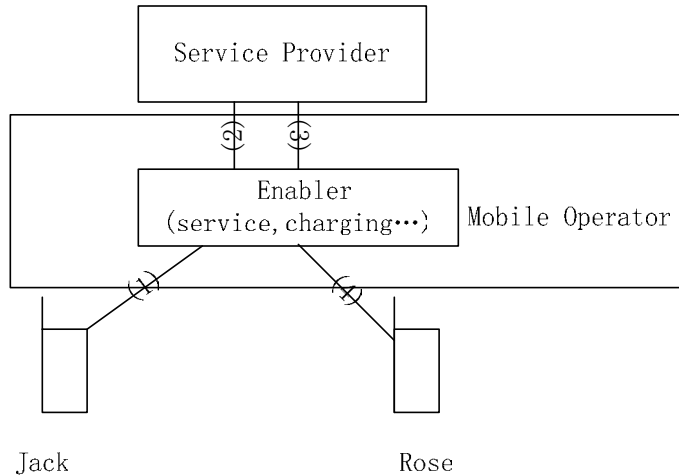
First, Jack access to the service provider's portal which sells the items through the network operator, as delicacy e-cards, ringing tones and others using his handset. He chooses a nice picture with a happy birthday song on this portal. The system asks him for some important additional information. For instance, he inputs his birthday congratulations on the e-card and the identification of the receiver (i.e. MSISDN). When Jack confirms all the content of the e-card, the service provider pushes a message to Rose. Rose receives one push message with an URI to the message, and downloads it with her handset.

Because this service includes two subscribers, the service provider and the operator, the charging enabler should generate a CDR that specifies the push service and who should pay for it.

5.1.6　Alternative Flow

If Rose's handset is not accessible, the push messages should be kept on the operator's network. As soon as his handset is accessible again, the push message should be send to her by the network.

5.1.7　Operational and Quality of Experience Requirements

There are different kinds of payment methods for the subscriber to choose. The service should be independent of them.

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5.2　Use Case TPSP, Request Check and User Interaction

Affected Areas				
Device	Connectivity	Enabling Services	Applications	Content
Tickmarks (X) Additional Keywords			X	X

Table 2: Affected Areas for Request Check and User Interaction

5.2.1　Short Description

One End User access a service given by a 3rd party service provider, selecting the download of a game.

The ACE receives a charge request from the 3rd party, requesting a charge before delivering the service requested by the end user. Operator needs to verify request truthfulness, and check consent of the user, as well as later delivery success.

5.2.2　Actors

- (Mobile) Network Operator

- End User

- 3rd party

- Agnostic Charging Entity, like the Mobile Network Operator's billing system

5.2.2.1   Actor Specific Issues

- Network Operator - ACE

    o   Needs to protect the user against fraudulent charges or failed deliveries

    o   The Network Operator acts as the ACE

- End User

    o   The End User wants to be safe against unwanted charges

    o   The End User wants to apply his own privacy and/or charging policies

- 3rd party

    o   The 3rd party wants the ACE to execute the charges

    o   The 3rd party wants to make sure that user has money to pay the requested service

5.2.2.2   Actor Specific Benefits

- Network Operator:

    o   Avoids fraud

    o   Strengthens trust relation with the end user

- End User

    o   End User is protected against fraudulent charges.

    o   End User feels control over his privacy and over his account, by specifying the privacy and charging
        policies he wants.

- 3rd Party

    o   3rd party gives services and gets revenues without the need to maintain a complex charging and billing
        system.

    o   3rd Party doesn't need to check if the user has money or not.

5.2.3   Pre-conditions

- There's an agreement between 3rd party and operator, so that:

    o   End users may access 3rd party services through operator's network

    o   The ACE (i.e. Network Operator) charges the End User on behalf of the 3rd party

    o   There's a revenue share model in place

- The user (via subscription or any other option) is allowed to access the services of the 3rd party

- User has put in place some charging policies, requesting explicit confirmation for any charging request coming from
  this 3rd party

5.2.4   Post-conditions

- The user gets access to the service.

- Service delivery is successful

- End User is charged for the usage of the service

5.2.5   Normal Flow

- The User gets access to the 3rd party services, and request the download of a game

- The 3rd party requests ACE to execute charge

- The ACE verifies that the end user is really requesting that service.

- The ACE verifies the charging policies of the user. The user's policy obligates to ask for his consent in these circumstances

- The Operator sends a message to the end user, sending information about service/price and asking for consent

- User give a positive answer

- The ACE checks that the user has enough money in his account and makes a reservation of the credit

- The Operator allows the 3rd party to deliver the service

- The 3rd party starts the download of the game into the end-users terminal

- When the download ends , the 3rd party asks the ACE to commit the charges over the reservation

- The ACE verifies that the download has been successful

- The PSP executes charging on the users account

5.2.6   Operational and Quality of Experience Requirements

Quality of Experience of the user shouldn't be impacted by the checks made about truthfulness of request, successful delivery checks, etc

5.3   Use Case TPSP, Mobile Betting Payment

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**
Tickmarks (X)	X	X		X
Additional Keywords				

Table 3: Affected Areas for Mobile Betting Payment

5.3.1   Short Description

This use case describes a complete football lottery process, including registering an account, buying the lottery, the refund process and rewarding, etc.

5.3.2   Actors

- End user

- Service Provider - Football lottery organizer

- Agnostic Charging Entity - ACE

- (Mobile) Network Operator

5.3.2.1   Actor Specific Issues

5.3.2.2   Actor Specific Benefits

5.3.3   Pre-conditions

- Mobile user applies for this service and registers an account used to buy the lottery. This account (Post-pay or pre-pay) is either his/her own phone bill account or a new account

- The ACE has an agreement with the football lottery organizer and they can authorize and authenticate each other.

- The end user obtains the information through Football lottery organizer's server or other means, and makes the decision before the payment.

5.3.4   Post-conditions

- According to the transaction's CDR generated by the ACE, the end user will have a different charge in the bill

- The Football lottery organizer and the ACE do the settlement with each other.

5.3.5   Normal Flow

- The end-user sends one football lottery request to the football lottery organizer through message, IVR or other means

- The football lottery organizer analyzes the content of the request. The football lottery organizer will send the rating parameters to the ACE and indicate the amount to be charged for the lottery

- The ACE will then check the account of the end user and handle the request from football lottery organizer. For post-paid users, a CDR will be generated, and for prepaid users, lottery fee will be charged in that moment

- The ACE communicates the success of the charging to the football lottery organizer

- The End User will receive the notification of the transaction result either from the ACE or the football organizer's Service Provider

- If the End User wins the prize of the football lottery, the football lottery organizer sends a reward request to the ACE

- The ACE adds the amount of the prize to the lottery account of the end user and gives a feedback to the football organizer about that fact. The end user receives the notification of prize information either from the ACE or the football organizer.

5.3.6   Alternative Flow

- If the mobile phone is not available or there is not any network coverage, the ACE need to keep the transaction information stored until it is successfully received

- It is possible that the end user asks for confirmation before any operation is done in his account. The ACE should provide a means to have this kind of interaction with the user

- The process of rewarding can be done by the football lottery system through other means without the ACE

- If the lottery transaction is finally failed due to some unpredictable reasons, the lottery organizer needs to send a refund request to Agnostic Charging Entity and indicate the refund sum. The ACE will then refund the end user and give that feedback to the football organizer.

5.3.7   Operational and Quality of Experience Requirements

None known

5.4   Use Case TPSP, Content Purchase

Affected Areas				
Device	Connectivity	Enabling Services	Applications	Content

Tickmarks (X)   X
Additional Keywords

<p style="text-align:center">Table 4: Affected Areas for Content Purchase</p>

5.4.1   Short Description

This scenario describes an ad-hoc purchase event. A user purchases a digital image that he wants to use as a background picture. Content discovery is by conventional methods.

5.4.2   Actors

- End user (Customer)

- Content Provider (merchant)

- (Mobile) Network Operator related to the Merchant (acquirer) – Content Provider's ACE

- (Mobile) Network Operator related to the Customer (issuer) – Customer's ACE

5.4.2.1   Actor Specific Issues

- The End User (customer) has to have an account with the User's ACE (issuer)

- The Content Provider (merchant) and the Content Provider's ACE (acquirer) has to have a trust relation

- The Customer's ACE (issuer) and the Content Provider's ACE (acquirer) have to have a trust relation

- The Customer's ACE (issuer) and Content Provider's ACE (acquirer) can be the same

5.4.2.2   Actor Specific Benefits

- The End User (customer) can get charged for and receive content on the mobile device

- The Content Provider can get access to user to provide its services

- The Customer's ACE (issuer) can charge for content delivered provided by the Content Provider (merchant)

- The Content Provider's ACE (acquirer) can charge for the connection between the Content Provider (merchant) and the Content Provider's ACE (acquirer)

5.4.3   Pre-conditions

- Delivery confirmation, funds transfer, authorization, rating and bonus handling is considered outside of scope

- All charges are accumulated on the ACE's phone bill or stored value account

5.4.4   Post-conditions

- The customer has been charged for and received the content

- The Customer's ACE (issuer) has charged the customer for the content.

5.4.5   Normal Flow

- The customer wants to buy a picture and has information about the merchant from whom to make the purchase

- The customer contacts the Content Provider (merchant), selects the image for download

- The Content Provider (merchant) gets a request for content and displays a list of User's ACE (issuers) or Content Provider's ACE (acquirers) available to the user

- The user selects the preferred User's ACE (issuer) or Content Provider's ACE (acquirer) (e.g. click on the logo of the operator)

- The Content Provider (merchant) sends a request to the Content Provider's ACE (acquirer) containing e.g. information about the content, price etc

- The Content Provider's ACE (acquirer) may add some information (e.g. price, acquirer information etc.) before forwarding the charging request to the User's ACE (issuer)

- The User's ACE (issuer) may produce a charging record for request before updating the customer's account

- The User's ACE (issuer) sends the Content Provider's ACE (acquirer) a response to the request, containing information about the charging (e.g. successful update of the customers account)

- The Content Provider's ACE (acquirer) forwards the response to the Content Provider (merchant)

- When the Content Provider (merchant) receives the response with a successful charging it send the image over to the customer's device

5.4.6   Alternative Flow

- The customer's account may be barred for some reason in the ACE

5.4.7   Operational and Quality of Experience Requirements

- The user experience should not be affected of the charging performed between Content Provider (merchant), Content Provider's ACE (acquirer) and Customer's ACE (issuer).

5.5   Use Case Other, Messaging while Roaming

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**

	Device	Connectivity	Enabling Services	Applications	Content
Tickmarks (X)	X	X		X	
Additional Keywords					

Table 5: Affected Areas for Messaging While Roaming

5.5.1   Short Description

User A is travelling in a foreign country. He is connected to a Visited Mobile Network Operator, thus being able to use his mobile. User A sends an MMS to User B in his country of origin. The charges originated by the MMS are of the same type that those that would have been generated in his Home Environment, with and addition of a roaming charge (i.e. an event with a price higher that the domestic case).

Depending of the operator policy, some additional charges can be added to the account (i.e. traffic)

5.5.2   Actors

- User A and User B

- Home Mobile Environment

- Visited Mobile Network Operator

- Service Provider

- Agnostic Charging Entities related the Home Environment and Visited Network Operator, like the Mobile Network Operator's billing system

5.5.2.1   Actor Specific Issues

- User A

  - User A must have an agreement with his Mobile Network Operator to be able to access the service in roaming situations. This agreement could imply additional restrictions to the services allowed to the user that those of the Home case

- Network Operators

  - Network Operators must have an agreement to provide services in the Visited Network Operator to the subscribers of the Home Environment.

- There are legal restrictions that apply in this use case

5.5.2.2   Actor Specific Benefits

- User A is able to access services while travelling abroad

  - For user A, the invocation of the service is done in the same way that when at home

- Home Environment

  - The Home Environment can provide its users with a service in a network other than its own, thus increasing revenues

- Visited Network Operator

  - Through sharing of revenues, the Visited Network Operator can generate additional revenues from services provided to customers of other Home Environments.

5.5.3   Pre-conditions

- User A is allowed to access his services in a foreign country

- Home Environment and Visited Network Operator have a roaming agreement, that is to say, an agreement so the Visited Network Operator can provide services to a customer of the Home Environment.

- The Mobile Terminal of User A is able to support the service provided.

5.5.4   Post-conditions

- Settlement between actors is done independently

- Some of the charges could be done online (i.e. User A's debit) while other are done offline (i.e. settlement between Network Operators)

5.5.5   Normal Flow

User A wants to send an MMS to User B. User A is connected to the Visited Network Operator and has the service activated to send MMS.

User A asks for the service. A bearer connection is opened between the Mobile Terminal and the MMSC (MMS server). The connection is used to send the MMS service information and data and then the connection is closed.

Charges are added for the event of the MMS send to the account of User A, along with a top-up charge for roaming usage. Depending on home environment's policy the user may have to pay for additional terminating / forwarding legs for traffic rerouting towards him. In addition, charges are added from the Visited Network Operator to the Home Environment due to the service delivered.

5.5.6   Operational and Quality of Experience Requirements

The user experience should not be affected by the charging.

5.6   Use Case I&E, Credit Check

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**

Tickmarks (X)	X	X		
Additional Keywords				

Table 6: Affected Areas for Public Transportation Service

5.6.1   Short Description

This use case describes a credit check done prior to service delivery. A user wants to buy a new ringing tone, logo, etc. to his mobile phone. Because the price of the service is small, the content provider only wants to make a credit check without any reservation.

5.6.2   Actors

- End-user (Customer)

- Content Provider (Merchant)

- Agnostic Charging Entity (Acquirer) - ACE

5.6.2.1   Actor Specific Issues

- Delivery confirmation is not considered.

- Content provider (issuer) makes a credit check, but no reservation from the user's account.

- The result of the credit check only indicates whether the user's account has enough credits or not

- It is not guaranteed that the user's account will have credit left when the content provider requests for the payment after the service is delivered

5.6.2.2   Actor Specific Benefits

- The content provider can check credit worthiness of the end-user before service delivery

5.6.3   Pre-conditions

- The end-user is able to access the content provider's server

- The authentication of the user is done automatically

5.6.4   Post-conditions

- User receives the service (and is charged for it afterwards)

5.6.5   Normal Flow

- The end-user requests for a service

- Content provider then contacts the selected Agnostic Charging Entity (ACE)

- The ACE gets a request for credit check from the content provider

- After ensuring that the user has enough credits for the service, a positive credit check response is returned to the content provider

- Content provider delivers the service

- End user is charged for the service

5.6.6   Operational and Quality of Experience Requirements

None identified

5.7   Use Case TPSP, 3rd Party Location Service

Affected Areas				
Device	Connectivity	Enabling Services	Applications	Content
		X		X

Tickmarks (X)
Additional Keywords

Table 7: Affected Areas for 3rd Party Location Service

5.7.1   Short Description

As part of his service to the customer, the restaurant "El Madroño" offers a "Best-way" service when reserving a table. The service consists in a map with the location of the service and the preferred way to reach it from the user current location. The service is not offered directly by the restaurant, but by the use of the "navigation service" offered by other 3rd party. The location service will be provided by the network operator.

5.7.2   Actors

- User A

- Mobile Network Operator

- Service Provider – Restaurant

- Service Provider – Navigation System

- Agnostic Charging Entity or Mobile Network Operator's billing system - ACE

5.7.2.1   Actor Specific Issues

- User A

  o Location service needs to have consent from the user

  o Customer information should not be shared without user consent. It is possible to have constraints in the user information that can be provided to the 3rd party. In that cases it should be possible to hide the user identity in some way to assure privacy

- Service Provider - Restaurant

    o Charges should be generated for the restaurant coming from the Network Operator and the 3rd party

- Service Provider – Navigation System

    o In order to provide its service, the "Navigation System" Service Provider must get the user position. That data must be got from the Network Operator. Charges should be generated for the service from the Network Operator to the Service Provider

- Network Operator

    o User's location information should not be provided without user's consent due to legal issues. The Network Operator should check that the user has given consent to give his location to a 3rd party

5.7.2.2   Actor Specific Benefits

- User A

    o User A can access a service that is a combination of services from several 3rd parties

- Service Provider - Restaurant

    o Service Provider can deliver advanced services to the user using other service provider's infrastructure

- Service Provider – Navigation System

    o Service Provider can generate additional revenues from the 3rd party use of his service

5.7.3   Pre-conditions

- Service Provider – Navigation System and Operator have an agreement to provide its services to other 3rd parties

5.7.4   Post-conditions

- Settlement is done

5.7.5   Normal Flow

User A makes a reservation for a table for dinner in the restaurant through his mobile. With the confirmation he is offered the "best-way" service to go to the restaurant from the current location.

User asks for the service.

The restaurant generates a service request to the "navigation service" provider for a path from the user's location to the restaurant. Charges are generated for payment to the "Navigation System" provider and from the "Restaurant" provider.

The navigation system, in turn, asks the Network Operator for the User's location using the service information to reference the agreement to get the user's location. In order to get an answer, the user is asked for permission to give his location to a 3rd party. As the user agrees the service is delivered from the Navigation System to the Restaurant.

The response is enhanced by the restaurant with the user reservation information and brand and sent to the customer. Charges are added to the User account for payment to the Service Provider from the User

5.7.6   Alternative Flow

The agreement could be done where charging is done on the account of the "Restaurant", and not from the account of the User A. In that context, the restaurant could pay the whole service on behalf of the user or a part of it. For instance, the restaurant could pay for the navigation service, while the user pays for the restaurant service and the navigation Service Provider for the location service. Any other possibility to share charges could be considered.

Also, permission to use the user's position could be granted before the execution of the service from the Service Provider – Restaurant, and not the Service Provider – Navigation System. Legal constraints should be considered in this case.

The anonymity of the user could be preserved by different ways, including explicit consent from the user to give his location and identity to the 3rd party, or the usage of an anonymous identifier or pseudonym to identify the user to the 3rd party when giving the location. In each case, there should be a means to link the charges applied to the different parties involved.

5.7.7 Operational and Quality of Experience Requirements

There are different kinds of payment methods for the subscriber to choose.

5.8 Use Case P2P, Multimedia Call

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**

	Device	Connectivity	Enabling Services	Applications	Content
Tickmarks (X)	X			X	
Additional Keywords					

Table 8: Affected Areas for Multimedia Call

5.8.1 Short Description

User A starts a voice communication with User B. After several minutes of conversation, he decides to introduce a video bearer in the communication. The video communication lasts 5 minutes and then it is terminated. The audio call continues all the time.

While the video communication is going on, the result call is identified as a multimedia call, and then the charges are added for an audio & video communication, and not as two separate communications of audio and video. However, charges will be applied in a flexible way, including charging to User A /B of all the communication, sharing of the charges for legs or bearer type, or charges to a 3rd party.

5.8.2 Actors

- User A and User B

- Network Operator

- Agnostic Charging Entity or Mobile Network Operator's billing system - ACE

5.8.2.1 Actor Specific Issues

- Addition of bearers to the conversation should need an agreement from both users. One user should not be able to establish a new bearer without consulting the other one (pick up).

- Charges depend on the business agreement.

- Interconnection and roaming has not been considered for this example.

5.8.2.2 Actor Specific Benefits

- User A

    o User A is allowed to add a video bearer (more expensive that the voice bearer) for only the time of the communication that he considers useful

    o The decision of an audio or video communication does not need to be done "a priori"

    o The rates applied for the new service (audio and video) can be different that the sum of the two services (audio and video) when provided separately

- Network Operator

    o The Network Operator can provide bundled services

5.8.3   Pre-conditions

- User A and User B's mobile terminals are able to access the service

- The Network Operator is able to provide the necessary capabilities for the voice and video call

5.8.4   Post-conditions

- Settlement is done

5.8.5   Normal Flow

User A starts a voice communication with User B. Charges are applied in the usual way to the users.

After a while, he decides to open a video bearer within the same communication, so he starts signalling. When user B accepts the bearer communication, the session goes on with the two bearers being operative. New charges are applied based on the new session parameters, including both bearers as separate elements or as part of the same service.

Depending on the user agreement, charges could be added to the User A account or shared between both users' accounts. It is also possible that a third party is charged for all the communication (i.e. a corporation providing the service to user A and B) or that user B is charged for all or part of the communication.

5.8.6   Alternative Flow

User B could also be the one adding the video bearer to the conversation, with the same considerations that when user A does it but with the User B as the preferred charged party for the communication. Charges in this case could be applied to both users for the bearer with the calling party pay principle or for any other means of sharing the charges.

In addition, it is possible for a 3rd party to be the one adding the video to the conference or to pay for part of the communication.

5.8.7   Operational and Quality of Experience Requirements

There are different kinds of payment methods for the subscriber to choose

5.9   Use Case I&E, Combined Business and Private Subscription

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**

	Device	Connectivity	Enabling Services	Applications	Content
Tickmarks (X)			X		X
Additional Keywords					

Table 9: Affected Areas for Combined Business and Private Subscription

5.9.1   Short Description

User A has a combined business/private subscription where usage between 8am and 8pm on weekdays is post-paid by his company, whereas for any off-peak usage charges are deducted from a private prepaid account. For this example, it will be considered that prepaid is done online and post-pay offline. This could imply that charges are sometimes applied online and offline for the same user and service. The user watches an evening news show (live video streaming) show starting at 7:45 pm (ending at 8:15 pm). The "segment" between 7:45 pm and 8pm is added to the corporate bill of the user's company. At 8:10pm the user is cut off the live broadcast, because his prepaid balance has reached 0 (after charges for 10 minutes live

broadcast have been deducted). In this particular case, charges will go from offline to online in the middle of a service delivery, thus having an impact in the way that charging is done. In any case, the same problems could arise from changes between several accounts, both in the offline-to-online case and in the online-to-offline one.

5.9.2   Actors

- User A

- Mobile Network Operator

- Service Provider

- Agnostic Charging Entity or Mobile Network Operator's billing system - ACE

5.9.3   Actor Specific Issues

- User A

    o   The User has a prepaid account associated to the SIM that will be used for charges outside of office hours and a post-paid account associated to it in the office hours

- Service Provider

    o   It should not be any difference for the Service Provider of the service delivery due to the fact that in the first part charging is done offline, while after 8 pm charges are done online

- Network Operator

    o   It should be possible for the network operator to change charging types from offline to online without disturbing the service

5.9.4   Actor Specific Benefits

- User A

    o   The User can have a unique Network Identifier (i.e. SIM card) for both business and private usage

- Service Provider

    o   The Service Provider is isolated from the payment system used by the user. It does not need to take of the charging method (online – offline) used in the network

- Network Operator

    o   The Network Operator can provide several means of payment and accounts associated to a SIM, thus increasing the possibilities for service deliveries

5.9.5   Pre-conditions

- The User has two accounts, one for business and one private.

- Access to the service is allowed for the user when applying charges to both the business and the private accounts

5.9.6   Post-conditions

- Settlement is done as necessary

5.9.7   Normal Flow

User A starts watching an evening news show at 7:45. Charges for the streaming service are done to his business account.

At 8:00, the account associated to the service delivery changes. From this moment charges are no longer added to his business account but to his private account. This change could imply a difference from direct debit to credit reservation in the account, depending on the account configuration.

At 8:10, the user's account runs out of credit, so the service delivery is interrupted.

5.9.8 Alternative Flow

It could be possible to recharge the user's account through means not included in this use case.

It is possible for the private account not to have access to the service. In that case, service would be terminated at 8:00, when accounts change.

Similar requirements could be derived by the change from online to offline charging in the middle of the service delivery. Thus, alternatives can be changes from any two accounts when this four cases: online-offline, offline-online, online-online, offline-offline.

5.9.9 Operational and Quality of Experience Requirements

There are different kinds of payment methods for the subscriber to choose.

5.10 Use Case TPSP, Rating

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**

Tickmarks (X)   X   X   X
Additional Keywords

Table 10: Affected Areas for Rating

5.10.1 Short Description

The user buys digital or physical goods or services for his PC or mobile device, e.g. MP3 files or video clips. The determination of the price and additional discounting or loyalty modifications are done by the Agnostic Charging Entity of the merchant (acquirer). The merchant only transfers the parameters describing the goods or services instead of the final price. The rating process may include

- *time or location dependent tariffs*

- *subscriber dependent tariffs*

- *goods may be paid not out of a monetary account but by using free unit allowances or bonus accounts*

- *charging for the goods may include add bonus points or free unit allowances*

Prior to service delivery the subscriber will be optionally presented the price (AoC) and prompted to confirm the payment, e.g. in a voice call placed to his/her mobile phone and asking to enter a PIN. She will find an appropriate bill entry on his/her mobile phone bill at the end of the month or her prepaid account is charged accordingly.

In case of unsuccessful service delivery the transaction will be rolled back.

5.10.2 Actors

- Subscriber

- Content Provider (Merchant)

- Agnostic Charging Entity (possibly even different ACEs) - ACE

  Note: The MNO may act as ACE and/or content provider

5.10.3 Actor Specific Issues

- The subscriber has to have an account at the ACE

- The Content Provider (merchant) and the ACE have to have a trust relation

5.10.4 Actor Specific Benefits

- The subscriber profits from attractive pricing models including loyalty schemes like discounting, which are possible through rating support

- The content provider profits from additional revenues. He can offer enhanced rating models without having to invest in infrastructure

- The ACE will experience reduced churn and will participate from the increased content provider's revenues

5.10.5 Pre-conditions

- The Agnostic Charging Entity has a contractual relationships with the subscriber and the Content Provider (merchant)

- The Content Provider (merchant) has deployed his pricing schemes / rate plans at the ACE

- The subscriber is willing to pay for an electronic good using her mobile phone

- The subscriber is willing to identify herself (e.g. by providing her MSISDN to the merchant)

- The Content Provider (merchant) has identified and authenticated herself to the ACE

5.10.6 Post-conditions

- Itemised bill is made available to customer by the ACE or correct amount is charged from his prepaid account

- Transaction information is available at the ACE which allows settlement with the Content Provider (merchant) at a later time. This settlement process may include a rating again to determine the revenue sharing between merchant and ACE

5.10.7 Normal Flow

- The Content Provider (merchant) initiates the charging by passing the service parameters to his ACE and requests a direct debit

- The ACE determines the final price based on predefined tariffs/rate plans

- In case of online charging, the ACE checks prepaid account thresholds or postpaid spending limits

- The ACE requests the subscriber to confirm the payment request and the determined price, possibly secured by a PIN

- The ACE charges the proper amount to the subscriber and adjusts loyalty schemes

- The ACE notifies the merchant about the successful charging

- The merchant allows the subscriber to access the good purchased

5.10.8 Alternative Flow

Missing user confirmation, or insufficient credits:

- If the check of account thresholds or spending limits determines that either one has been exceeded, the ACE cancels the whole transaction and notifies the merchant that the payment had failed

- If user confirmation (as described above) fails, the ACE cancels the whole transaction and notifies the merchant that the payment had failed

Unsuccessful delivery of the requested good:

- If the subscriber cannot access the good purchased, e.g. due to sudden network failure, the Content Provider (merchant) initiates a refund of the debited amount. The refund results in crediting the correct amount to the subscriber's account

5.10.9 Operational and Quality of Experience Requirements

The user experience should not be affected by the charging performed between merchant and ACE.

5.11 Use Case I&E, Terminal Application Initiated Charging

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**
X	X		X	X

Tickmarks (X)
Additional Keywords — Device (end-user)

Table 11: Affected Areas for Terminal Application Initiated Charging

5.11.1 Short Description

Charging of resources used by an application is to be done on a per-use basis rather than on a one-time basis for the purchase or download of the application. Typically an initial basic functionality or usage for a certain time is free, additional features or additional usage is to be charged. At that point, the application generates the relevant charging information (e.g., application identifier, application provider, amount to be charged, etc.). This information is forwarded to a payment module in the device which takes care of conducting the payment procedure. Once the payment is successfully completed, the application receives a notification and the pertinent action (e.g., download of new piece of software, allow further usage, etc.) is triggered.

In its simplest form, the payment module comprises support for a payment instrument provided by the Agnostic Charging Entity where rating and advice-of-charge dialogs can be either terminal or server originated. For example, in the case of a simple premium SMS based charging, rating information can be injected inside the application triggering the payment request. Alternatively, the payment details and the advice-of-charge dialog could be obtained from network..

5.11.2 Actors

- End user

- Application (running on the terminal)

- Application provider

- Agnostic Charging Entity

- Payment module provider

5.11.3 Pre-conditions

- The application is able to interact with the payment module on the device

- The payment module is able to handle the charging information generated by the application to realize the payment

- Provisioning data describing payment details is injected into application prior to application download

5.11.4   Post-conditions

- The User is entitled to access the resources for which he has agreed to pay

- The User is billed according to the proper procedures of the payment instrument

5.11.5   Normal Flow

- An application provided by an application provider is running on the user's device

- At a certain point, to proceed with its usage, the application triggers a charging request passing the relevant information to the terminal's payment module

- Payment module validates the request and the provisioned payment details. The validation verifies if there is need to connect to the network server for rating purposes and the validity period of the payment details

- After user confirmation, the payment module conducts the payment procedure

- The Agnostic Charging Entity confirms the successful payment

- The application is informed about the successful outcome of the payment procedure

- The original application can further be used or an additional component can be downloaded

5.11.6   Alternative Flow

Alternative flows could result of specificities of the payment instrument used and from missing user confirmation or unsuccessful payment (e.g. due to empty prepaid account).

Alternative scenarios can be also generated due to how rating is done, e.g. changes in the tariff.

5.11.7   Operational and Quality of Experience Requirements

It seams appropriate to have common procedures for the exchange information between different applications and the payment module.

5.12   Use Case I&E, Charging of a Streaming Service

Affected Areas				
Device	**Connectivity**	**Enabling Services**	**Applications**	**Content**
	X			X

Tickmarks (X)
Additional Keywords

Table 12: Affected Areas for Charging of a Streaming Service

5.12.1   Short Description

A content provider offers a streaming service, such as a video, radio channel or an on-demand game service that is set up specifically for easy mobile access and purchase. The end user selects the service. Optionally the end user is provided with a rate or a price estimation of the service (e.g. 1 EUR per minute). The end user agrees that the fee for accessing the content is added to the user's mobile phone bill or charged from her prepaid account.

Depending on the service level agreement between subscriber and the Agnostic Charging Entity (ACE) – i.e. the Mobile Network Operator- , the ACE may initiate a dialogue with the customer's mobile device, asking to confirm the payment with, e.g. a PIN. The confirmation transaction is carried out across one channel e.g. via SMS, USSD, or voice.

The cost of the transaction is dependent on a metered quantity of the provided service, such as the elapsed time or data volume in addition to other parameters as the quality of gaming sessions (or lives of game characters, levels…). In some cases mixtures of different metering schemes are used, e.g. combinations of download volume and time. The underlying access charging may form one part of the total price of the service or the access charging maybe set free of charge.

5.12.2   Actors

- Subscriber (end user)

- Content provider (Merchant / may also be the mobile network operator)

- Agnostic Charging Entity (mobile network operator's billing system) - ACE

5.12.3   Actor Specific Issues

- The content provider and the Agnostic Charging Entity (may be also the mobile network operator) have a commercial relationship

5.12.4   Actor Specific Benefits

- The end-user is able to use her mobile phone to access a streaming service

- The content provider gets revenues from providing the streaming service

- The Agnostic Charging Entity gets additional revenues through commercial agreement with the content provider

5.12.5   Pre-conditions

- The end-user is able to access the content provider's server
- The authentication of the user is done automatically. The content provider is able to identify the end user
- The subscriber wants to access a streaming service offered by a content provider (who may also be the mobile network operator)
- The user requests the service and is able to identify herself
- The content provider makes an offer and proposes a pricing method (e.g. volume based). This optional advice of charge as well as a user confirmation is seen as a separate use case

5.12.6   Post-conditions

- The end-user receives the streaming service
- The fee for accessing the service is added to the user's mobile phone bill or charged from her prepaid account

5.12.7   Normal Flow

- The End User requests for content, and the content delivery is started

- In case of online charging, prepaid account thresholds or postpaid spending limits are checked prior to service usage. (The determination of the tariff for service usage is a separate use case. The tariff may vary, e.g. a first preview interval may be charge free.)

- Optionally the End User is prompted to authorise payment, possibly using a PIN, preferably on the same device that is used to access the service

- Charging is started by reserving/debiting a certain amount of credits (for e.g. the next five minutes)

- The user begins to use the service

- The Content Provider meters the service usage

- At defined intervals (of time or other metered quantity), as previous credits are used, new debit/reservation operation is done. If reservations are applied, the previous reservation is committed. In case of online charging, prepaid account thresholds or postpaid spending limits are again checked prior to service usage

- The End User stops using the service. At the same time charging is stopped and the unused reserved/debited units are cancelled/refunded. In case of new reservation the used portion of the reservation is committed

5.12.8   Alternative Flow

Alternative flows result from missing user confirmation or unsuccessful payment, e.g. due to empty prepaid account.

No major difference expected depending on the pricing method used.

5.12.9   Operational and Quality of Experience Requirements

The option to use PIN numbers depends on the desired trade-off level between customer purchase convenience and the limits needed to lessen fraud risk.

5.13 Open Issues

There are no know open issues.

6. Requirements (Normative)

6.1 High-Level Functional Requirements

HLFR 1, Credit Check, Charging of a Streaming Service, Mobile Betting Payment	The charging enabler MUST provide methods for credit control: • Credit check • Reservations • Commitments of reservations • Rollback • Debit (either over reservations, or directly to the account) • Refund • Cumulative charges (Several reservations, and a "commit charge" afterwards) • Reverse Rating (i.e. ask for the price of an event) • Modification of charging parameters in an ongoing charging session • Cancellations of unused portions of previous reservations
HLFR 2, Mobile Betting Payment	The charging enabler SHALL support the refund of charges to be initiated by the merchant, the acquirer, or the issuer
HLFR 3	The charging enabler SHALL support credit control for both prepaid and post-paid customers
HLFR 4	The charging enabler SHOULD support charging where multiple consecutive reservations and commits requests are done, when the total amount to be charged for a service is not known in advance
HLFR 5	If a service requires reservation before granting service access the service SHOULD use at least one more interrogation to complete the transaction The charging enabler MUST have an alternative mechanism to release one reservation if the service does not complete the transaction
HLFR 6	A charging enabler MUST have the possibility to grant different kind of quota for a service, including time, bytes, events and monetary, or equivalent, units
HLFR 7	There MAY be more than one type of quota granted; if so the service MUST report when one of the quotas is depleted
HLFR 8	The service MAY be rated before quotas are granted
HLFR 9	The charging enabler SHALL support monetary and non-monetary units (e.g. loyalty points)
HLFR 10	The service SHOULD support success and failure notifications of the provided service
HLFR 11, Credit Check, Charging of a Streaming Service, 3rd Party location service	When the OMA service layer is controlling the credit, it MUST be able to: • Accept an expiration time period for the credit acquired. Additional causes for credit expiration could be also provided • Accept credit that is shared among the several Service Providers that are involved in providing a service, so the OMA service layer provides credit control coordination for

	all the parties involved
	• To acquire certain units of time/volume/events as the credit unit.
	o The credit acquired may be referred to service units in this way (i.e. credit for 10 events)
	o Or the credit acquired may be monetary units with a relationship between service units and credit (i.e. 10 monetary-units, the service is 1 monetary-unit/event). The relationship between service units and credit does not imply that monetary units can be converted into money
	• It SHOULD be possible to acquire units of different measurements (i.e. volume and time, whichever ends first). This will allow a credit of the type (10 Megs or 5 minutes)

HLFR 12	The charging enabler SHOULD provide a means to use transactional control. That is to say, each service delivery process is included in a credit transaction, and charges applied depend on the outcome of the service transaction. Transactional control SHOULD be the preferred way to perform credit control.
	
	 • When possible, each service should realize charges within a transaction.
	 • Transactions will consist on
	     o An event at the init of the transaction. Initial steps should imply AAA for authorization of the operation. This authorization and authentication phase should allow for additional capabilities like policy enforcement and the application of security policies/preferences of the user. It is not decided how and where this polices and preferences will be enforced.
	     o Zero or more transaction interim events
	     o An event for the end of the transaction.
	 • The outcome of the transaction MUST be known. It SHOULD be, at least, one of the following ones, and will include additional information:
	     o The service has been correctly provided
	     o The service has been cancelled
	     o The has been an error while providing the service
	     o Only part of the service has been provided

HLFR 13, Multimedia Call, Combined Business and Private Subscription	The charging enabler MUST NOT use a defined structure for the user's accounts. The account structure can change depending of business requirements from the ACE
HLFR 14, Charging of a Streaming Service, Combined Business and Private Subscription	The charging enabler MUST support service provider initiated modification of charging parameters in an ongoing charging session, e.g. when the end-user enters a bonus level that is free of charge in an on-line gaming session or service related parameters change
HLFR 15, Combined Business and Private Subscription	The charging enabler MUST support multiple charging accounts per subscriber
HLFR 16	The charging enabler MUST provide enough information to allow the ACE to perform some

	rating for specific needs: • It MUST support that the service provides pre-rating information • It SHOULD accept charging information to adjust its behaviour (i.e. the ACE asking for offline or online charging) The charging enabler SHOULD use information provided by the ACE about the service. Some of that information could be identifiers that will be used in the communications with the ACE. When credit control is performed, it MUST be possible to set up expiration dates for the credit acquired or a predefined number of events. It MUST be possible to receive credit for one service in the following situations: • The credit is shared between different services • When asking for some amount of credit, the result is a combination of credits, for instance, the streaming service asks for 10 mins. credit and he's returned 5 mins. free credit and 5 mins. rate x credit
HLFR 17	The charging enabler MUST generate enough information in order to allow the ACE to perform the identification or correlation of all charging events coming from different domains/elements/actors (bearer charges, content charges, 3rd party charges, etc.) in order to generate the final rate for the service
HLFR 18	Rating of a service MUST consider: - All the elements involved in the delivery of the service, including bearer charges, session charges and event/content charges - Specific prices for that event due to bundling, promotions, protected content, rights objects, etc. - The difference between requested capabilities and those provided (i.e. the user asks for a premium service and he is granted a normal one) - Account used for the charges
HLFR 19, Rating	It SHOULD be possible for the merchant to delegate the determination of the price for the purchased good (aka "rating") to the ACE
HLFR 20	It SHOULD be possible for the merchant to determine the price locally and request the ACE to charge exactly that price
HLFR 21, Rating	The charging enabler MUST support charging input parameters related to the service provided, which affect user/subscriber charges
HLFR 22, Content Purchase, Multimedia Call, Terminal Application Initiated Charging	The charging enabler MUST consider three levels for charging: • Bearer • Session • Application/Content It MAY be possible to have several bearers, sessions or applications as part of the same service
HLFR 23, Multimedia call, WAP Push Service	The charging enabler SHOULD consider that charging can be done based on: • Volume (upload, download, a combination of those), time and event • Separated charges for each type of medium or service used

	• Each leg of a service independently • Technology used to deliver the service, including the QoS requested/used to deliver the service • Additional information (location, presence, push services), etc
HLFR 24	The charging enabler MUST be independent of the payment method used to provide it
HLFR 25	It MUST be possible to deliver the service in the same way irrespective of the user charging information (prepaid or post-paid user, etc)
HLFR 26	The charging enabler SHALL allow charging customers for obtaining services or purchasing goods, no matter what the nature of the services or goods are. In particular, charging for content or digital goods (e.g.weather forecasts or ringtones, protected content or rights objects) and charging for services (e.g. WLAN access time, receiving the "goal of the day as a streamed video, or using a conference bridge) SHALL be supported
HLFR 27, Charging of a Streaming Service	It SHALL be possible for the end-user to set limits for accumulated charges, volume of transferred data, number of events, etc. per time interval
HLFR 28, Charging of a Streaming Service	The charging enabler MUST support service charging metered by the service provider
HLFR 29	It SHALL be possible for any party to add another media to the current service delivery 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
HLFR 30	During an active session, media types can change (e.g. audio changed to data) and SHALL be charged for appropriately. It is thus necessary for the implementation to detect a change of media during a service delivery so that the charging enabler may apply different rating
HLFR 31	It SHALL be possible to charge the end-user according to the service used irrespective of the technology used to deliver it
HLFR 32	It SHALL be possible to charge the end-user according to the technology used to deliver a service
HLFR 33	It SHALL be possible to suppress charging for certain types of services (e.g. when a customer receives tones or announcements during sessions such as automated pre-pay top-up)
HLFR 34	The merchant interactions MUST NOT depend on which payment instrument is used by the customer
HLFR 35	There SHOULD be a means for a merchant to discover which payment instrument a customer is using
HLFR 36	The charging enabler MAY support offline charging to be used as a backup for the online charging
HLFR 37	The charging enabler MUST provide information that allows the service provider to stop or grant a user's access, based on the charging account status (e.g. expired or barred)
HLFR 38, Credit Check, Charging of a Streaming Service	The charging enabler MUST support resolving the account type of the end-user. E.g. if the end-user has a prepaid or a post-paid agreement (to determine e.g. whether on-line or off-line charging should be used)
HLFR 39	The charging enabler SHALL support widely used identification mechanisms to identify the customer to the ACE. In particular, the charging enabler SHOULD support the following:

	• MSISDN: The merchant may automatically determine the customer's MSISDN (if the underlying communication protocol allows so, e.g. if the service being charged for is based on a voice call), or they may ask the customer explicitly to convey the MSISDN as an identity (e.g., in a WLAN scenario) • Username/PIN[/TAN]: The customer may be requested to manually enter this information. • IP address: Typically, the IP address is assigned by the ISP to user agent devices. When the ISP also acts as the ACE, the IP address could be used for identifying the customer • Account numbers
HLFR 40	The ACE MUST make sure that the customer has given his consent prior to be charged for the service or good purchased, and in particular to the price, before charging the customer. • The ACE MAY request customer consent by interacting directly and in real time with the customer • The ACE may rely on pre-configured rules to determine customer consent for a charging request • If there is an interaction, it SHOULD be presented to the user a description of the goods or services that he is about to buy, the fact that there will be a charge, and the actual amount he's going to be charged, along with other information
HLFR 41	Services MUST be authorized prior to the delivery • The service should be authorized in the Service Provider and the ACE (provisioning) • The user should consent on the service delivery and the payment method (user preferences). • The user must be authorized to use the service (not blacklisted) • The authorization can be provided at the same time that the service itself (self-provisioning)
HLFR 42, Request Check and User Interaction	The charging enabler MUST allow for the notification to the User of the charges that are going to be applied for the service (i.e. Advice of Charge) • The notification SHOULD be configurable by the ACE • The notification SHOULD be configurable by the User • It MUST be allowed notifications of changes of tariff (i.e. "You are accessing a service that has a premium tariff") • It MUST be allowed notifications where user's authorization for the charges is needed ("You are going to be charged 3€ in your account, accept/deny") • Charges notified SHOULD include the final price, including all charging levels to be considered.
HLFR 43, Charging of a Streaming Service, Terminal Application Initiated Charging	The Advice of Charge (AoC) SHOULD indicate to the end-user an estimation of the service costs before the service is delivered, during the service delivery and after the service delivery The estimation could be presented, for instance, as a final price, a rate, a tariff, or an indication that the service is not free of charge
HLFR 44, Charging	The charging enabler SHOULD support informing the end-user about the balance of his pre-

of a Streaming Service	paid or post-paid accounts
HLFR 45, Content Purchase	The charging enabler SHALL support the roles according to the reference model: customer, issuer, acquirer, merchant
HLFR 46, Content Purchase	The charging enabler SHALL allow an actor to assume multiple roles at a time. The charging enabler SHALL allow a role to be split across multiple actors at a time The merchant interactions MUST NOT make assumptions whether issuer and acquirer roles are taken by different actors or by a single actor
HLFR 47, Content Purchase	The charging enabler MUST specify a means by which a merchant can delegate the charging of the customer to an acquirer
HLFR 48, Content Purchase	The charging enabler SHOULD allow the merchant to take the charges for the bearer which is used by the customer to access the merchant's service[1]
HLFR 49, Content Purchase	The charging enabler SHALL NOT assume a permanent contractual relationship (subscription) between the customer and the merchant
HLFR 50	The charging enabler SHALL support payment with the device
HLFR 51	The charging enabler SHOULD support multiple currencies
HLFR 52	The charging enabler SHOULD allow the same service for a roaming subscriber that is provided to the subscriber when not roaming
HLFR 53	It SHALL be possible to charge the end-users when they are roaming in the same ways to when they are not roaming. For example, if duration based charging is used for charging for streaming music when not roaming, then it shall be possible to apply the same principle when the user is roaming It SHALL be possible to charge the end users specific charges when they are roaming It SHALL be possible to charge the end-users when they are roaming in different ways (i.e. different types of charges) to when they are not roaming It SHALL be possible to charge the end-users additional charges when they are roaming
HLFR 54, 3rd Party Location Service, Charging Requirements for Mobile Services	There MUST exist a method to identify uniquely one instance of a service. That method SHOULD allow an external party to know, at least: • Service Provider's identifier (i.e. Network Identifier, 3rd Party identifier, etc) • Service Identifier • User identifier • Time and date The method will allow a spectator to differentiate between service instances. It would allow to differentiate, for instance, the same service sent to the same users in different times (i.e. differentiate the download of the same ring-tone twice)
HLFR 55, Content Purchase	The charging enabler MUST provide interfaces for third party charging

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[1] For instance, this is applicable if an MNO provides the bearer and at the same time acts as the merchant's acquirer for charging. It allows offering the end user a fixed price for a service that already includes all related bearer charges. The MNO (being the acquirer at the same time) applies the bearer charges to the merchant.

HLFR 56	It SHALL be possible to split the charges between any of the parties, including 3rd parties
HLFR 57	The information provided by the charging enabler SHOULD be configurable and extensible, depending on the needs of the ACE and the availability of new parameters
HLFR 58	The charging enabler MUST provide enough information for mechanisms based on Fraud Avoidance and Revenue Assurance to work. The charging enabler MUST provide a mechanism to ensure that the service can be provided to the user for the charging perspective prior to the delivery of it: • It MUST be possible to assure that the User has given its permission to be delivered the service • It SHOULD be possible to revoke the permission to deliver a service for charging reasons • It MUST provide Non-repudiation mechanisms to all the interfaces
HLFR 59, Terminal Application Initiated Charging	The charging enabler MUST be able to handle terminal application initiated charging requests
HLFR 60, Terminal Application Initiated Charging	The charging enabler MUST provide mechanisms to initialize and update the charging related configuration data for a particular application
HLFR 61, Terminal Application Initiated Charging	The trigger initiating a charging procedure MUST be charging enabler implementation agnostic
HLFR 62, Terminal Application Initiated Charging	The charging enabler MUST be capable of notifying the application of the outcome of the charging procedure triggered by that particular application (e.g. successful completion). This information MAY also be displayed to the user
HLFR 63	The charging enabler SHALL support subscription based charging
HLFR 64	The charging enabler SHOULD support charging of different session types. E.g. 1-1 video session, many – many PoC session, 1 – many broadcast session

Table 13: High-Level Functional Requirements

6.1.1   Security

SEC 1	The information used for charging SHOULD be secured by any means available - Information channels SHOULD be secured - Information integrity SHOULD be provided - Authentication of information and senders MUST be provided
SEC 2	The charging enabler SHALL be combined with the mechanisms defined by the OMA's Security Common Function in order for the ACE to identify and authenticate the merchant
SEC 3, Request Check and User Interaction	There SHOULD be a means to allow the ACE to ensure that it relies on a customer consent that is genuine and has not been tampered with
SEC 4	The charging enabler SHOULD provide support for the ACE to log received user consent in an auditable manner
SEC 5, 3rd Party	It MUST be possible to identify and authenticate all relevant participants involved to a service

Location Service, WAP Push Service	delivery in order to ensure accurate charging and prevent fraud. Examples of participants that may be relevant to a service delivery are:
	• Customer (e.g. a mobile phone user)
	• Service Provider
	• Network Operator
	• Device (e.g. a mobile terminal)

Table 14: High-Level Functional Requirements – Security Items

6.1.2 Charging

Table 15: High-Level Functional Requirements – Charging Items

6.1.3 Administration and Configuration

Table 16: High-Level Functional Requirements – Administration and Configuration Items

6.1.4 Usability

Table 17: High-Level Functional Requirements – Usability Items

6.1.5 Interoperability

Table 18: High-Level Functional Requirements – Interoperability Items

6.1.6 Privacy

PRV 5, 3rd Party Location Service	It MUST be possible to use pseudonyms to refer to one user to maintain his privacy:
	• In a way that makes it possible for the Third Party to differentiate users (i.e. a unique way hash)
	It MUST be possible for a user to identify anonymously to a Service Provider:
	• In a way that identifies an instance of a service to the ACE, allowing only the ACE to identify the user and the account
	The choice of one method of anonymity may depend on user preferences, business agreement, service necessities or other circumstances.
PRV 2, Credit Check	The balance of the charging account MUST NOT be revealed without proper consent from the end user

Table 19: High-Level Functional Requirements – Privacy Items

6.2 Overall System Requirements

Table 20: High-Level Functional Requirements – Security Items

6.3 System Elements

Table 21: System Elements

Appendix A.   Change History   **(Informative)**

A.1   Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2   Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-RD_Charging-V1_0	24 Mar 2004	1	Incorporates the scope of the RD as the scope chapter

	07 Apr 2004	4, 5.1, 6	Incorporates input:
			    OMA-REQ-2004-0251-Charging-IntroText
			    OMA-REQ-2004-0215-Charging-req-for-push-service

	10 May 2004	5.2, 5.3, 5.4, 5.5, 5.6	Incorporates input:
			    OMA-REQ-2004-0081R01-Charging-Use-Cases
			    OMA-REQ-2004-0322R01-MCC_UC1and2_ContentPurchase
			    OMA-REQ-2004-0360R02-MCC-UC28-Betting

	21 Jun 2004	1, 5.7, 5.8, Appendix B	Incorporates input:
			    OMA-REQ-2004-0226R01-Charging-M-Commerce-Model
			    OMA-REQ-2004-0336R01-CR_OMA-RD_Charging-V1_0_0-20040324-D
			    OMA-REQ-2004-0378-MCC-UC-11-Public_Transp
			    OMA-REQ-2004-477R01-MCC-Use-Case-Roaming
			    OMA-REQ-2004-0555-CR_Change_of_word_policy
			Editorial changes in the document in order reflecting the template for RD in OMA

	5 July 2004	5.9, 5.10, 5.11, 5.12, 5.13	Incorporates input:
			    OMA-REQ-2004-0293R01-Charging-UC16-Roaming
			    OMA-REQ-2004-0329-MCC_UC8_CreditCheck
			    OMA-REQ-2004-0478R03-MCC-Use-Case-Loser-Party-Pays
			    OMA-REQ-2004-0480R02-MCC-Use-Case-3rd-party-location-service
			    OMA-REQ-2004-0606-LATE-MCC-Use-Case-Multimedia-Call with changes agreed

	19 July 2004	3.2, 5.14, 5.15, 5.16, 5.17, 5.18, 5.19, 5.20	Incorporates input:
			    OMA-REQ-2004-0362R03-MCC-Charging-Dictionary
			    OMA-REQ-2004-0323R03-Game-Download
			    OMA-REQ-2004-0479R03-Combined-Business-Private
			    OMA-REQ-2004-0664-LATE-Charging-UC15-Rating
			    OMA-REQ-2004-0665-LATE-Charging-UC17-WLAN-Access
			    OMA-REQ-2004-0331R03-MCC-UseCases7and18
			    OMA-REQ-2004-0230R03-Charging_use_cases_tracket (only Use Cases)

	11 Aug 2004	5.21	Incorporates input: OMA-REQ-2004-0330R02-MCC-UCs-19and5-Streaming-Service-Charging Editorial changes throughout chapter 5.
	23 Aug 2004	5, 6.1	Editorial changes. Introduction of the Agnostic Charging Entity (ACE) to be able to provide charging requirements without providing architecture. Incorporates input: OMA-REQ-2004-0706-Charging-Requirements OMA-REQ-2004-0748-Charging_RD-Requirement_Input OMA-REQ-2004-0724R02-CR-Charging-Requirements OMA-REQ-2004-0711R04-Charging-Requirements OMA-REQ-2004-0780R01-Requirements_for_Charging-RD

Document Identifier	Date	Sections	Description
	27 Sep 2004	2, 3.2, 3.3	Additions to the references and abbreviations
			Deletion of redundant definitions
			Incorporates inputs:
			OMA-REQ-2004-0779R02-Terminal-Application-Charging-Requirements
			OMA-REQ-2004-0865-Compiled-MCC-Contribution-to-Charging-RD with editorial comments
			OMA-REQ-2004-0895R01-LATE-MCC-Addition-to-charging-dictionary
	29 Sep 2004	2,5	Deletion of redundant use cases
			Deletion of redundant requirements
	29 Oct 2004	6	Editorial changes
	15 Nov 2004	All document	Editorial changes. Orthographic corrections
	17 Nov 2004	All document	Change "Home Network Operator" to "Home Environment".
Candidate Version OMA-RD_Charging-V1_0	18 Nov 2004	n/a	Status changed to Candidate by TP
			TP ref # OMA-TP-2004-0439-Charging-V1_0-RD-For-Approval

Appendix B.   General Reference Model for Mobile Commerce and Charging   (Informative)

B.1   General Reference Model for Mobile Commerce

Mobile Commerce brings together a number of industries with different terminology, understandings of, and underlying architectures for, payment, charging and billing. In addition, each of the fora working within mobile commerce has developed different terminology and architectures. There is a need to define the terminology to be used within OMA, and to bring together the work of the OMA on charging into the wider context of the work of OMA on mobile commerce.

A functional reference model has been developed within MCC. The scope of this model is wider than charging, for example it includes delivery and settlement, and so not all aspects have direct relevance to the charging requirements, however it does provide the context in which the charging work is undertaken.

This is an abstract model which identifies the four key roles in any mobile commerce transaction. In practice, one or more roles may be played by a single entity (for example, an operator may play the role of issuer and acquirer in a charging system), or the functions of a role may be distributed between more than one physical entity (for example, a consumer may delegate some of the functionality to a wallet).

The model is designed to be as general as possible, and to be applicable to all forms of payment and charging. The model does not imply a particular order in which the functions occur, nor does it indicate over which channel each of the functions takes place. In a given payment or charging system (that is, a physical realisation of the payment or charging part of the mobile commerce model) some of the functions may be implicit.

The exchange of funds in return for goods or services is modelled by a payment transaction. A payment transaction (often referred to as simply a transaction in the context of this document) consists of the presentation of the Transaction Details to the customer and the response of transaction credentials to the merchant. The response of Transaction Credentials by the customer implies an acceptance of the Transaction Details (including price and conditions). The acceptance of the Transaction Credentials by the Merchant will trigger the Delivery of the Goods and Services, and the transference of funds.

The four roles identified by the general reference model are:

- The Customer who wishes to obtain goods or services

- The Merchant who provides goods or services

- The Issuer who provides the consumer with a means to pay for the goods or services

- The Acquirer with whom the merchant interacts to receive funds for the goods or services

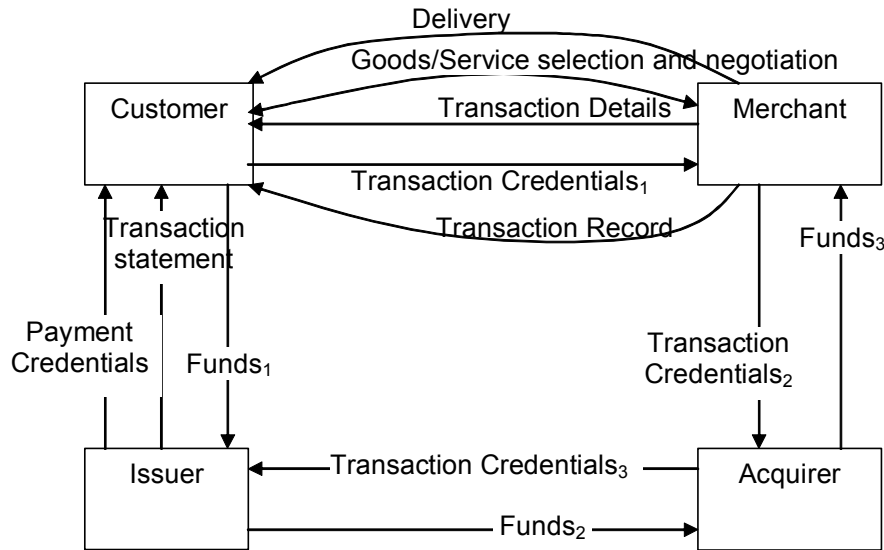The model is described in more detail below.

Figure 1: M-Commerce Reference Model

Note that the model provides an abstract view of what information is passed between the various parties to the transaction. It does not indicate any particular ordering of the information flow. For example, in a prepay system, the issuer usually obtains funds from the customer at the time of issuing the credentials, whereas in a postpay system the issuer obtains funds from the customer after the credentials have been used in a transaction..

B.1.1   Negotiation and Delivery

The customer and the merchant must interact in order for the customer to select services, and for the two entities to negotiate goods and services required, the conditions under which the goods and services are provided, and the price for the goods and services. This phase includes *advertising* or *discovery*, by which the availability of goods and services is made known to the customer by the merchant. It also includes a selection phase where the customer indicates to the merchant what goods and services are desired. The customer and merchant also *negotiate* the price of the goods and services, as well as the terms and conditions. The negotiation phase results in the merchant providing the *transaction details* to the customer. The transaction details describe the transaction, containing for example the price, description of goods or services, and the merchant name.

The merchant delivers the goods and/or services to the customer (*Delivery*). The means of delivery vary depending on the nature of the goods/services, for example digital goods may be delivered over the mobile channel, whereas physical goods must be delivered physically. In a subscription model, the services may be delivered over a period of time after the purchase of the subscription.

Associated with the delivery is *payment* for the goods and/or services. Payment is the process by which the customer presents the merchant with transaction credentials, as a response to the transaction details, which are sufficient for the merchant to agree to provide the customer with the goods and/or services. The relative timing of the delivery and payment can vary depending on the type of goods and services, the type of payment, and the rules of the payment association.

B.1.2   Payment Credentials

In order to allow the customer to make payments, the issuer must first provide *payment credentials* to the customer.

The nature of the *payment credentials*, and the method by which they are conveyed, may vary between payment systems, and they need not have any intrinsic value (although in some systems they may).

B.1.3   Transaction Credentials

The payment credentials are then used to execute a transaction with a merchant. After a phase of negotiation between the customer and the merchant, in which the goods or services and associated price are determined, the merchant provides the customer with the *transaction details*. The customer then responds to the merchant with *transaction credentials$_1$*.

The transaction credentials are derived from the payment credentials but with potentially more information. The transaction credentials need to convey to the issuer's satisfaction that the customer was entitled to make use of the payment credentials, and that the customer approved the particular transaction. Thus the transaction credentials are formed from a combination of the payment credentials, the transaction details, and some authentication of the customer.

The form of the transaction credentials, the extent to which customer authentication is required, and the type of authentication all vary from one payment system to another. Further, it should be noted that, while the authentication is for the benefit of the issuer, the issuer might delegate the authentication function to another party.

The merchant needs to ensure to their satisfaction that the transaction credentials provided to them are valid since they expect to receive funds on the basis of transaction credentials.

The transaction credentials may contain sufficient information to provide validation (for example, a bank note contains many features to verify it is genuine), or it may require additional steps to verify the credentials (for example, the merchant may request an authorization of a credit card transaction). The need for, and the means of, validation vary from payment system to payment system, and may vary from merchant to merchant.

The merchant provides some derivative of the transaction credentials (indicated in Figure 1 as *Transaction Credentials₂*) to the acquirer, in order to request funds. The means by which the *Transaction Credentials₂* are sent, and the form are dependent upon the payment system.

The merchant provides a *Transaction Record* providing information about the transaction details and the status of the transaction to the customer.

The acquirer passes a derivative of the *Transaction Credentials₂* received from the merchant (indicated in Figure 1as *Transaction Credentials₃*) to the issuer.

Note that the sending of transaction credentials may be done in multiple steps (for example, split or recurring transactions), or only performed based on various conditions (for example, upon successful delivery). The particulars are specific to a payment system.

B.1.4   Movement of Funds

To complete the payment, it is necessary for funds to be moved from the customer to the merchant. Funds may or may not have monetary value. For example, a customer may be paying for a service with loyalty points rather than money.

On the basis of *Transaction Credentials₃* the issuer releases *Funds₂* to the acquirer, who in turn provides the *Funds₃* to the merchant. *Funds₂* and *Funds₃* are related to one another, and the price in the *transaction details* in a manner defined by the payment association. Typically the amounts differ due to processing fees.

The customer provides *Funds₁* to the issuer. *Funds1* is related to the price in the *transaction details* (often it is the same value) and so to *Funds2* and *Funds3* in a manner defined by the payment association. The issuer also provides a *Transaction Statement* to the customer. The transaction statement may be provided per transaction, or may aggregate a number of transactions, for example, over a period of time. The transaction statement may be used to request funds from the customer (for example a monthly bill), or may simply provide the customer with a record of transactions received by the issuer.

B.2   Charging in the Reference Model

The charging function may be used in two of the steps in the reference model.

If the underlying payment system is a charging based system, then the charging function generates the transaction credentials – each chargeable event may be considered a transaction.

If the underlying payment system is not a charging based system, then the charging function may be used to generate the transaction details, and payment is made for a set of chargeable events.

B.2.1   Examples

The following examples are chosen to illustrate how charging may used within the reference model. Note that there may be more than one way of modelling a service.

B.2.2   Telephony

This section describes mobile telephony in terms of the reference model. This example describes a post-pay, mobile originated, calling party pays scenario.

B.2.3   Actors

- The customer is the mobile subscriber.

- The issuer is the home environment to which the customer subscribes (Operator A).

- The merchant is the operator of the mobile network in which the customer makes a call (Operator B).

- The acquirer is the operator of the mobile network in which the customer makes the call (again, Operator B).

B.2.4   Actor Specific Issues

Note that the role of merchant and acquirer is taken by the same entity. If the customer is making the call in his or her home environment (that is, Operator A and B are the same entity), then the network operator is the taking the roles of issuer, acquirer and merchant.

B.2.5   Preconditions

Operator A and Operator B have a roaming agreement in place

B.2.6   Postconditions

The customer has paid Operator A for calls made in Operator B's network.

Operator B has received funds based on the calls made by the customer in Operator B's network.

B.2.7   Normal Flow

1. Operator A issues the customer with payment credentials in the form of a network identification token (for example, a SIM).

2. The service pricing is generally provided by the home environment in the form of a pricing schedule. The customer will select a service by entering the number of the party he or she wishes to call. The selected service together with the pricing schedule form the transaction details, and each call will be a transaction.

3. The customer dials a number and initiates a call. *Transaction Credentials$_1$* are sent (through the signalling network) from the customer to Operator B (the merchant). *Transaction Credentials$_1$* are the result of the network identification and authentication. This may be done on a per transaction basis (where identification/authentication occurs before every call), or may apply for multiple transactions (for example, it may occur when the customer registers on the network).

4. Charging data records (CDRs) are generated by the call and form *Transaction Credentials$_2$*, transmitted from the merchant to the acquirer. The roles of acquirer and merchant are both played by Operator B, so in this case this will be internal to Operator B's charging system.

5. At some point in time, settlement between Operator A and Operator B is performed, and the CDRs, or data derived from the CDRs are transferred from Operator B to Operator A, form *Transaction Credentials$_3$*.

6. On the basis of these *Transaction Credentials$_3$* Operator A will provide *Funds$_2$* to Operator B. As Operator B is both the acquirer and the merchant, the transfer of *Funds$_3$* is implicit. (If Operator A is Operator B, that is, the customer is not roaming, then the transfer of *Transaction Credentials$_3$* is implicit.)

7. The calls (transactions) made by the customer over a period of time are aggregated.

8. Operator A issues a bill (the *Transaction Record*) to the customer.

9. On the basis of the bill, the customer provides the required *Funds$_1$* to Operator A (the issuer).

B.2.8   Buying content on operator bill

This example considers buying digital content, such as a ring tone, from a third party content provider, and paying for the content by having it charged to an operator bill.

B.2.9   Actors

- The customer is the mobile subscriber.

- The issuer is the network operator to which the customer subscribes.

- The merchant is the content provider.

- The acquirer is the network operator.

B.2.10   Actor Specific Issues

It is assumed that the content provider has a relationship with the home environment (this is not a limitation of the model, but rather a simplification for the purposes of this example illustrating how charging fits in the model.)

B.2.11   Preconditions

The content provider and operator have a commercial agreement in place for the purposes of payment for content on the operator bill.

B.2.12   Postconditions

The cost of the content will appear on the customer's bill and the merchant will receive funds based on the value of the content.

B.2.13   Normal Flow

1. The home environment issues the customer with payment credentials in the form of a network identification token (for example a SIM).

2. The customer accesses the content provider's site via the mobile device

3. The customer selects the content to be purchased.

4. The transaction details (content that is chosen, price and so on) are provided by the content provider to the customer. *Transaction Credentials$_1$* are sent by the customer to the merchant – the form of the transaction credentials is dependent on the payment system[2].

5. The content provider will generate *Transaction Credentials$_2$* based on *Transaction Credentials$_1$*. The format depends on the payment system, and how tightly the merchant is linked into the charging system of the home environment. For example, the content provider may generate a CDR as *Transaction Credentials$_2$* which is sent directly to the charging

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[2] The form of the transaction credentials is somewhat out of scope for the charging requirements, but needs to be considered in an overall payment system based on charging to the operator bill. The customer may be required to manually enter the transaction credentials (such as the MSISDN), or the transaction credentials may be provided implicitly by the operator to the merchant, for example in header information. Where the transaction credentials are supplied by the operator there is a level of authentication which has already occurred (when the customer accesses the user network), whereas if the transaction credential are entered manually then there may be a need for further authentication.

system of the home environment, or the merchant may send a message to the operator which generates a chargeable event (and hence a CDR) in the operator charging system.

From this point the process flows as outlined in the telephony example in section B.2.2, and the transaction to buy content will be incorporated in the transaction record (e.g. bill) that the home environment provides to the customer.

B.2.14   Pre Prepaid and Online Charging

This use case describes a prepaid and online charging event as seen in the 4-box model. The use case describes a normal prepaid and online charged call.

B.2.15   Actors

- Customer: end-user

- Merchant: visited mobile network operator (MNO).

- Acquirer: visited mobile network operator.

- Issuer: home environment.

Actor Specific Issues

- The end-user needs to have an agreement with the home environment.

- The home environment and visited mobile network operators need to have an agreement.

Actor Specific Benefits

The benefit of this use case is to have the possibility to support prepaid and online charging.

B.2.16   Post-conditions

- The end user is charged for the call.

- The visited mobile operator gets paid for the network access.

- The home environment gets paid for the network access.

B.2.17   Normal Flow

The end-user is going to travel outside the home environment and wishes to make a call to a user in the visited mobile network.

1. The home environment provides the end-user with a subscription, including MSISDN and IMSI, i.e. the issuer provides the customer with Payment Credentials.

2. The end user uses a voucher to refill the home environment account, i.e. the customer transfers funds to the issuer.

3. The end user browses the visited MNOs home page to get the latest pricelist for making calls in the visited MNO, i.e. i.e. the customer receives the Transaction Details from the merchant.

4. The end-user roams into the visited MNO and initiates a call to a user in the visited network, i.e. the customer sends Transaction Credentials to the merchant and the customer makes Service selection from the merchant.

5. The visited MNO contacts the home environment to verify that the end-user has enough money to make the specific call, i.e. the acquirer requests a Transaction Authorization from the issuer.

6. The home environment verifies that the end-user has enough money to be allowed to make the call, i.e. the issuer authorizes the transaction for the acquirer.

7. The end-user is allowed to start the call and after a while ends the call.

8. The visited MNO produces a CDR describing the event, i.e. the merchant produces a Transaction Record, and the acquirer generates the Transaction Credentials.

9. The visited MNO contacts the home environment to inform about the specifics of the call, i.e. the acquirer sends an updated Transaction Authorization to the issuer.

10. The home environment deducts the cost of the call from the end-users account and start producing a CDR of the event, i.e. the issuer authorizes the transaction for the acquirer and starts producing the Transaction Statement.

11. The home environment and visited MNOs perform settlement, i.e. the merchant and acquirer send the Transaction Credentials to the issuer and the issuer responds by transferring funds to the acquirer and merchant.

12. The home environment finalizes the CDR for the event, i.e. the issuer updates the Transaction Statement.

B.2.18 Alternative Flow

- Step number 2 could be performed by other means than voucher, like paying a bill, could be used to refill the account.

- The account could be empty or have no credit worthiness.

- The account gets empty or loses its credit worthiness during the call.

B.2.19 Operational and Quality of Experience Requirements

The end-user should not notice the difference between using prepaid and post-paid.