



# **White Paper on Charging Work Split**

Approved Version 1.0 – 15 Mar 2005

---

**Open Mobile Alliance**  
**OMA-WP-Charging\_WorkSplit-V1\_0-20050315-A**

Use of this document is subject to all of the terms and conditions of the Use Agreement located at <http://www.openmobilealliance.org/UseAgreement.html>.

Unless this document is clearly designated as an approved specification, this document is a work in process, is not an approved Open Mobile Alliance™ specification, and is subject to revision or removal without notice.

You may use this document or any part of the document for internal or educational purposes only, provided you do not modify, edit or take out of context the information in this document in any manner. Information contained in this document may be used, at your sole risk, for any purposes. You may not use this document in any other manner without the prior written permission of the Open Mobile Alliance. The Open Mobile Alliance authorizes you to copy this document, provided that you retain all copyright and other proprietary notices contained in the original materials on any copies of the materials and that you comply strictly with these terms. This copyright permission does not constitute an endorsement of the products or services. The Open Mobile Alliance assumes no responsibility for errors or omissions in this document.

Each Open Mobile Alliance member has agreed to use reasonable endeavors to inform the Open Mobile Alliance in a timely manner of Essential IPR as it becomes aware that the Essential IPR is related to the prepared or published specification. However, the members do not have an obligation to conduct IPR searches. The declared Essential IPR is publicly available to members and non-members of the Open Mobile Alliance and may be found on the “OMA IPR Declarations” list at <http://www.openmobilealliance.org/ipr.html>. The Open Mobile Alliance has not conducted an independent IPR review of this document and the information contained herein, and makes no representations or warranties regarding third party IPR, including without limitation patents, copyrights or trade secret rights. This document may contain inventions for which you must obtain licenses from third parties before making, using or selling the inventions. Defined terms above are set forth in the schedule to the Open Mobile Alliance Application Form.

NO REPRESENTATIONS OR WARRANTIES (WHETHER EXPRESS OR IMPLIED) ARE MADE BY THE OPEN MOBILE ALLIANCE OR ANY OPEN MOBILE ALLIANCE MEMBER OR ITS AFFILIATES REGARDING ANY OF THE IPR'S REPRESENTED ON THE “OMA IPR DECLARATIONS” LIST, INCLUDING, BUT NOT LIMITED TO THE ACCURACY, COMPLETENESS, VALIDITY OR RELEVANCE OF THE INFORMATION OR WHETHER OR NOT SUCH RIGHTS ARE ESSENTIAL OR NON-ESSENTIAL.

THE OPEN MOBILE ALLIANCE IS NOT LIABLE FOR AND HEREBY DISCLAIMS ANY DIRECT, INDIRECT, PUNITIVE, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF DOCUMENTS AND THE INFORMATION CONTAINED IN THE DOCUMENTS.

© 2005 Open Mobile Alliance Ltd. All Rights Reserved.

Used with the permission of the Open Mobile Alliance Ltd. under the terms set forth above.

# Contents

1. SCOPE .....	4
2. REFERENCES .....	5
3. TERMINOLOGY AND CONVENTIONS .....	7
3.1 CONVENTIONS .....	7
3.2 DEFINITIONS.....	7
3.3 ABBREVIATIONS .....	7
4. INTRODUCTION .....	9
5. CLASSIFICATION OF WORK .....	10
6. CURRENT STATUS .....	11
6.1 STATUS OF 3GPP SA5 SWGB.....	11
6.1.1 Overview of Charging in 3GPP .....	11
6.1.2 Overview of the Specification Work.....	13
6.1.3 Current SA5 SWGB Activities .....	14
6.2 STATUS OF 3GPP2 TSG-X CHARGING STANDARDS.....	14
6.2.1 Overview of Charging in 3GPP2 .....	14
6.2.2 Overview of the Specification Work.....	16
6.2.3 Current TSG-X PSN MMD Activities.....	18
6.2.4 Current TSG-X CSN Activities .....	18
6.3 STATUS OF OMA.....	19
6.3.1 OMA Overview .....	19
6.3.2 Overview of the Specification Work.....	20
6.3.3 Current Activities in OMA and OMA MCC.....	22
6.3.4 What OMA MCC intends to do in the future? .....	22
7. RELATION BETWEEN 3GPP/2'S CHARGING MODEL AND THE OMA SERVICE ENVIRONMENT .....	23
8. PRINCIPLES .....	25
9. RECOMMENDATIONS.....	27
APPENDIX A. CHANGE HISTORY.....	28

# Figures

Figure 1: 3GPP Logical charging functions & charging information flow.....	11
Figure 2: 3GPP Logical ubiquitous charging architecture and information flows.....	12
Figure 3: 3GPP Charging Documents Structure .....	13
Figure 4: Current 3GPP2 IMS Document Structure.....	17
Figure 5: OMA Objective.....	19
Figure 6: OMA WG Structure.....	20
Figure 7: OMA Service Environment - OSE.....	21
Figure 8: M-Commerce Model .....	22
Figure 9: 3GPP/2 Charging Model and OMA Service Environment.....	23
Figure 10: 3GPP, 3GPP2 and OMA Working Principles .....	25

# 1. Scope

This document describes how the standardization bodies and industry fora OMA, 3GPP and 3GPP2 work together on the subject of charging for applications and services, and sorts the specific responsibilities of each of the bodies.

The scope of this document is to summarize the current status of charging specification work in each of the bodies and how their solutions relate to each other. It is also in scope to define general principles for sharing responsibility for future specification work on the subject of charging, and to identify areas where specific coordination is needed between the bodies in order to avoid inconsistencies and facilitate interoperability of the different bodies' charging solutions.

It is not in the scope of the current document to define any new deliverables, or to shift responsibility of deliverables that are already being worked on. It is also not in the scope to define any specific workflow or communication between the bodies, or any other processes.

## 2. References

- [OMA-Dictionary] OMA-Dictionary-V2\_1-20040914-A, Dictionary for OMA Specifications V2.1
- [TS32.240] 3GPP TS 32.240, Charging Architecture and Principles;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.240/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.240/)
- [TS32.250] 3GPP TS 32.250, Circuit Switched (CS) domain charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.250/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.250/)
- [TS32.251] 3GPP TS 32.251, Packet Switched (PS) domain charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.251/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.251/)
- [TS32.252] 3GPP TS 32.252, Wireless Local Area Network (WLAN) charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.252/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.252/)
- [TS32.260] 3GPP TS 32.260, IP Multimedia Subsystem (IMS) charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.260/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.260/)
- [TS32.270] 3GPP TS 32.270, Multimedia Messaging Service (MMS) charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.270/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.270/)
- [TS32.271] 3GPP TS 32.271, Location Services (LCS) charging  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.271/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.271/)
- [TS32.272] 3GPP TS 32.272, Push-to-Talk over Cellular (PoC) charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.272/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.272/)
- [TS32.273] 3GPP TS 32.273, Multimedia Broadcast/Multicast Service (MBMS) charging;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.273/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.273/)
- [TS32.295] 3GPP TS 32.295 Charging Data Record (CDR) transfer;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.295/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.295/)
- [TS32.296] 3GPP TS 32.296, Charging Architecture and Principles;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.296/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.296/)
- [TS32.297] 3GPP TS 32.297, Charging Data Record (CDR) file format and transfer;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.297/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.297/)
- [TS32.298] 3GPP TS 32.298, Charging Data Record (CDR) parameter description;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.298/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.298/)
- [TS32.299] 3GPP TS 32.299, Diameter Charging Application;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.299/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.299/)
- [TR32.815] 3GPP TR 32.815, On-line Charging System architecture study;  
[ftp://ftp.3gpp.org/Specs/archive/32\\_series/32.815/](ftp://ftp.3gpp.org/Specs/archive/32_series/32.815/)
- [3GPPMeetings] 3GPP Meetings, <http://www.3gpp.org/Meetings/meetings.htm>
- [N.S0026-A] Wireless Radio Telecommunication Intersystem Non-Signaling Data Communication DMH, Revision A; [http://www.3gpp2.org/Public\\_html/specs/index.cfm#tsgn](http://www.3gpp2.org/Public_html/specs/index.cfm#tsgn)
- [S.R0075-0] Accounting and Auditing All-IP System Requirements;  
[http://www.3gpp2.org/Public\\_html/specs/index.cfm#tsgs](http://www.3gpp2.org/Public_html/specs/index.cfm#tsgs)
- [X.S0013-000-0] 3GPP2 X.S0013-000-0 v1.0, All-IP Core Network Multimedia Domain Overview;  
[http://www.3gpp2.org/Public\\_html/specs/index.cfm#tsgx](http://www.3gpp2.org/Public_html/specs/index.cfm#tsgx)
- [X.S0013-007-0] 3GPP2 X.S0013-007-0 v1.0, All-IP Core Network Multimedia Domain: IP Multimedia Subsystem - Charging Architecture; [http://www.3gpp2.org/Public\\_html/specs/index.cfm#tsgx](http://www.3gpp2.org/Public_html/specs/index.cfm#tsgx)
- [X.S0013-008-0] X.S0013-008-0 v1.0, All-IP Core Network Multimedia Domain: IP Multimedia Subsystem - Accounting Information Flows and Protocol;  
[http://www.3gpp2.org/Public\\_html/specs/index.cfm#tsgx](http://www.3gpp2.org/Public_html/specs/index.cfm#tsgx)

[X32-20040607-003] 3GPP2 TSG-X June 2004 Contribution in PSN/MMD subgroup, X32-20040607-003, RevA  
Charging Specs Realignment

## 3. Terminology and Conventions

### 3.1 Conventions

This is an informative document, which is not intended to provide testable requirements to implementations.

### 3.2 Definitions

See reference [OMA-Dictionary].

### 3.3 Abbreviations

<b>2.5G</b>	2.5 <sup>th</sup> Generation
<b>3G</b>	3 <sup>rd</sup> Generation
<b>3GPP</b>	Third Generation Partnership Project
<b>3GPP2</b>	Third Generation Partnership Project 2
<b>3GPP/2</b>	3GPP and 3GPP2
<b>ABMF</b>	Account Balance Management Function
<b>AF</b>	Application Function
<b>AS</b>	Application Server
<b>BGCF</b>	Breakout Gateway Control Function
<b>BoD</b>	Board of Directors
<b>CAMEL</b>	Customised Application for Mobile network Enhanced Logic
<b>CAP</b>	CAMEL Application Part
<b>CDF</b>	Charging Data Function
<b>CDMA</b>	Code Division Multiple Access
<b>CDR</b>	Charging Data Record
<b>CGF</b>	Charging Gateway Function
<b>CS</b>	Circuit Switched
<b>CSCF</b>	Call Server Control Function
<b>CSN</b>	Circuit Switched Network
<b>CTF</b>	Charging Trigger Function
<b>DRM</b>	Digital Rights Management
<b>ERA</b>	Evolution, Requirements and Architecture
<b>GGSN</b>	Gateway GPRS Support Node
<b>GPRS</b>	General Packet Radio Service
<b>GSM</b>	Global System for Mobile communications
<b>GW</b>	GateWay
<b>I-CSCF</b>	Interrogating - Call Session Control Function
<b>IMS</b>	IP Multimedia Subsystem
<b>IP</b>	Internet Protocol
<b>ISC</b>	IMS Service Control

<b>LCS</b>	Location Services
<b>MBMS</b>	Multimedia Broadcast/Multicast Service
<b>MCC</b>	M-Commerce and Charging
<b>M-Commerce</b>	Mobile-Commerce
<b>MGCF</b>	Media Gateway Control Function
<b>MMD</b>	Multimedia Domain
<b>MMS</b>	Multimedia Messaging Service
<b>MRF</b>	Media Resource Function
<b>MRFC</b>	MRF Controller
<b>MSC</b>	Mobile Switching Centre
<b>OCS</b>	Online Charging System
<b>OMA</b>	Open Mobile Alliance
<b>OSE</b>	OMA Service Environment
<b>P-CSCF</b>	Proxy - Call Session Control Function
<b>PoC</b>	Push-to-talk over Cellular
<b>PS</b>	Packet Switched
<b>PSN</b>	Packet Switched Network
<b>QoS</b>	Quality of Service
<b>REQ</b>	Requirements
<b>RF</b>	Rating Function
<b>SA</b>	Systems Aspects
<b>S-CSCF</b>	Serving - Call Session Control Function
<b>SGSN</b>	Serving GPRS Support Node
<b>SIP</b>	Session Initiated Protocol
<b>SMS</b>	Short Message Service
<b>SWG</b>	Sub-Working Group
<b>SWGB</b>	Sub-Working Group B
<b>TPF</b>	Traffic Plane Function
<b>TS</b>	Technical Specification
<b>TSG-X</b>	Technical Specification Group - Core Networks
<b>WAP</b>	Wireless Application Protocol
<b>WG</b>	Working Group
<b>WI</b>	Work Item
<b>Wi-Fi<sup>1</sup></b>	Wireless Fidelity
<b>WIN</b>	Wireless Intelligent Network
<b>WLAN</b>	Wireless Local Area Network
<b>WML</b>	Wireless Markup Language

---

<sup>1</sup> © 2004 Wi-Fi Alliance. All rights reserved. Wi-Fi® is a registered trademark of the Wi-Fi Alliance. Wi-Fi CERTIFIED(tm), WMM(tm), WPA(tm), WPA2(tm) and Wi-Fi ZONE(tm) are certification marks of the Wi-Fi Alliance.

## 4. Introduction

The objective of OMA work item 0095 is to evaluate a work split between the standardization activities related to charging to be done in OMA-MCC, 3GPP and 3GPP2. The current document will propose a work split, which has to be confirmed by involved organizations. The mechanisms for cooperation will be developed under the umbrella of the larger OMA, 3GPP cooperation and OMA, 3GPP2 cooperation and with the consideration of the MCC group and relevant groups of 3GPP/2.

The Landscape Report and the Gap Analysis Report of OMA MCC investigated and documented which specifications are available and which are missing in the m-commerce and charging area. The intention was to avoid double work and endorse existing or extended specifications instead. Among the fora that have been analyzed, 3GPP and 3GPP2 have a special significance, in that these organizations have a great deal of specifications available that are closely related to the activities of MCC.

The overlap between the activities of the groups stems from the fact that

- 3GPP and 3GPP2 are specifying online and offline charging systems and
- OMA specifications enable services which maybe charged by using these systems

Examples include but are not limited to

- PoC
- MMS
- DRM

Since there are no generic mechanisms suitable for all services, specific charging descriptions are to be specified. This can potentially be done along with the specification of the service (thus in OMA) or along with the overall specification of the online and offline charging systems (thus in 3GPP/2).

The scope of the WI and this document does not include charging for services, which are not specified by OMA but by 3GPP/2. These include but are not limited to

- Voice calls and SMS
- IP access in 2.5G and WLAN/Wi-Fi
- Charging for access and IMS session in 3G

However there is a relationship between charging for these pure network services and the charging for OMA services, which will be taken into account. The charging mechanisms have to support the correlation of access and session charging with service charging in the online and offline charging systems. Apart from this, the charging mechanisms should be harmonized as far as possible to save operator operational expenses and vendor efforts and to increase uniform subscriber experience.

## 5. Classification of work

In the past, services provided mainly connectivity. Charging for such connectivity services was typically based on duration, volume and subscription. However, this is no longer suitable for the current market with emerging applications and increasing customer base. The demand for ever richer services is satisfied by flexibly combining existing services and applications with each other or with network capabilities. Each of the involved services, applications and network capabilities may be provided by a different stakeholder. The total cost of the service will depend on the costs induced by the involved services, applications and network capabilities.

As an example, there may be a WAP service to locate the nearest restaurant offering a specific cuisine. This service offering will involve a user location capability, a circuit switched data session or packet switched data session (depending on user choice) to carry the WML pages, and the actual dynamic WAP application combining the user preferences and location with the list of restaurants and rendering the result. The total costs might be split between the restaurant being suggested by the service and the end-user requesting the service. The collected charges need to cover the costs for providing the location, providing the data bearer, and selecting the restaurant for the end-user.

When a service offering is assembled from other network capabilities, services and applications, the involved network elements will typically generate separate charging information for each involved service, application, or capability. The information generated can be classified as follows:

**Bearer level:** This is information about which kind of connectivity has the end-user has been provided with, such as carrying IP packets between the end-user device and some application server, and about resource consumption associated with connectivity (duration, volume), possibly with a particular QoS.

**Session level:** On top of the bearer services, the underlying network may provide communication services, such as a voice call, a multimedia call, or a PoC session. Session level charging information records which communication services have been used and what the resource consumption was.

**Application, or content level:** This information describes the type of content the end-user has actually been provided with (typically using some bearer and some session), such as a ring tone, weather forecast, restaurant suggestion, etc.

For each level, the nature of the charged service can be categorized as follows:

**Discrete:** The service offering can be considered as itemized, where each consumed item has a clearly defined value, which can be determined in advance. Items could be: Web pages, Lives (in games), ring tones, etc.

**Continuous:** The service offering is of a continuous nature and needs to be metered (e.g. based on volume or duration) in order to charge for the service consumption. Examples for services of a continuous nature are an IP bearer, a voice call, or an audio broadcast.

Several charging levels and methods will be combined for a concrete service offering, depending on the services, applications, and network capabilities involved in providing the service.

## 6. Current status

### 6.1 Status of 3GPP SA5 SWGB

#### 6.1.1 Overview of Charging in 3GPP

3GPP's specifications dealing with charging have to cover a variety of different technologies (circuit switched domain, packet switched domain, IMS), services (voice calls, data calls, multimedia sessions), "levels" (access, session, service) etc. To accommodate these different environments in the most efficient way, they have developed a general charging model, first occurring in Rel. 6, which comprises a set of logical functions and their communication relationships. The entities and their interactions are described in detail in 3GPP's [TS32.240] "Charging Architecture and Principles". The general charging model is then applied to the different environments. The respective 3GPP specifications are [TS32.250] – [TS32.289]. 3GPP's specifications and their relationships are explained in more detail in 6.1.2 and 6.1.3.

##### 6.1.1.1 3GPP's General Charging Model

For convenience, 3GPP's charging model is depicted in the following figure and summarized below:

3GPP Logical Charging Functions & Charging Information Flow in 3GPP Rel-6

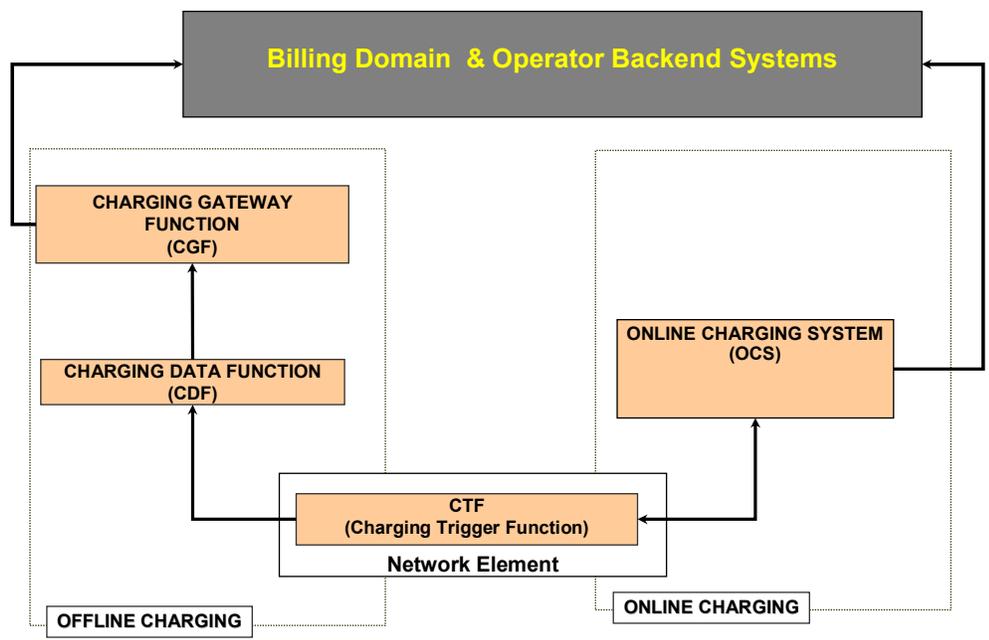


Figure 1: 3GPP Logical charging functions & charging information flow

The source of all charging information is called a *Charging Trigger Function (CTF)*. A CTF is associated with each network element that provides charging information. The CTF observes the resource within the network element, and generates charging events reflecting this.

Originating from the CTF, there are different information flows for online and offline charging.

For **offline charging**, the CTF passes the charging events to the *Charging Data Function (CDF)*. The CDF creates Charge Detail Records (CDR's) from the events it receives. The CDF may create a CDR from each individual event it receives, or it may create a CDR from a sequence of linked events. The CDF passes the CDR's further on to the *Charging Gateway Function (CGF)*, which is mainly responsible for keeping CDR's in a persistent storage until they are eventually passed on to the Billing Domain. The CGF may additionally process, consolidate

and/or re-format the CDR's. The *Billing Domain* rates the resource usage as reported in the CDR's and creates the debts and bills for the subscribers.

For **online charging**, the CTF engages in a two-way communication with the *Online Charging System (OCS)*. The OCS comprises the Account Balance Management Function (ABMF), which maintains the subscribers' account balances, the Rating Function (RF), which rates the events received from the CTF, and the Online Charging Function (OCF), which controls the RF and the ABMF.

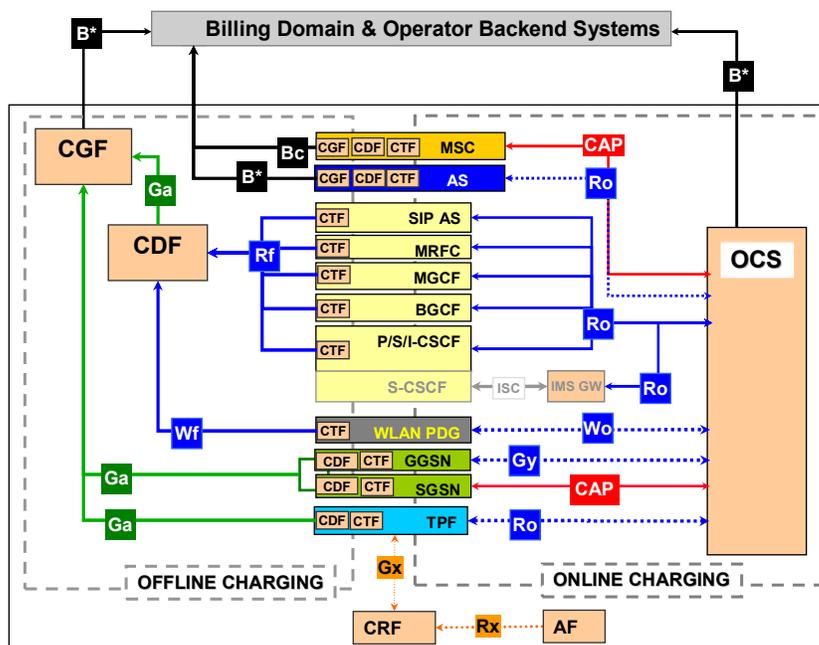
Before the network element provides any resources, its CTF asks the OCS for permission. As a response, the OCS grants certain quotas for the resource usage. While the network element provides the resources, its CTF continuously supervises the resource usage and checks against the granted quotas. When the quotas expire or are exceeded, the CTF interrogates the OCS again to grant new quotas. When the OCS does not grant new quotas, the CTF instructs the network element to stop providing the resource. Unused quotas are returned to the OCS. The OCS also creates and stores CDR's describing the resource usage that occurs in the network element. These CDR's will eventually be sent to the Billing Domain. However, unlike the CDR's created for offline charging, the online CDR's serve mainly for statistics and loyalty systems, but will typically not end up on a bill.

In order to support online charging, the CTF needs to support more capabilities than for offline charging, namely the ability to delay actual resource usage until the OCS has granted permission and quotas, the ability to terminate resource usage if quotas have expired or exhausted and no new quotas have been granted, and the ability to continuously check resource usage against the quotas granted by the OCS.

### 6.1.1.2 Applying the General Charging Model

Applying the general charging model to a specific environment means to identify the network elements within that environment that shall provide charging information. Each such network element is assumed to have an CTF instance associated with it. The further specification work describes the interworking of this particular network element with its associated CTF, the events that the CTF will be able to generate, and the data that will be included with the events.

By doing so for the environments defined by 3GPP, the following diagram has been created and included in [TS32.240], "Charging Principles for Rel. 6". It lists all network elements from the different environments in 3GPP that generate charging information and thus contain a CTF.

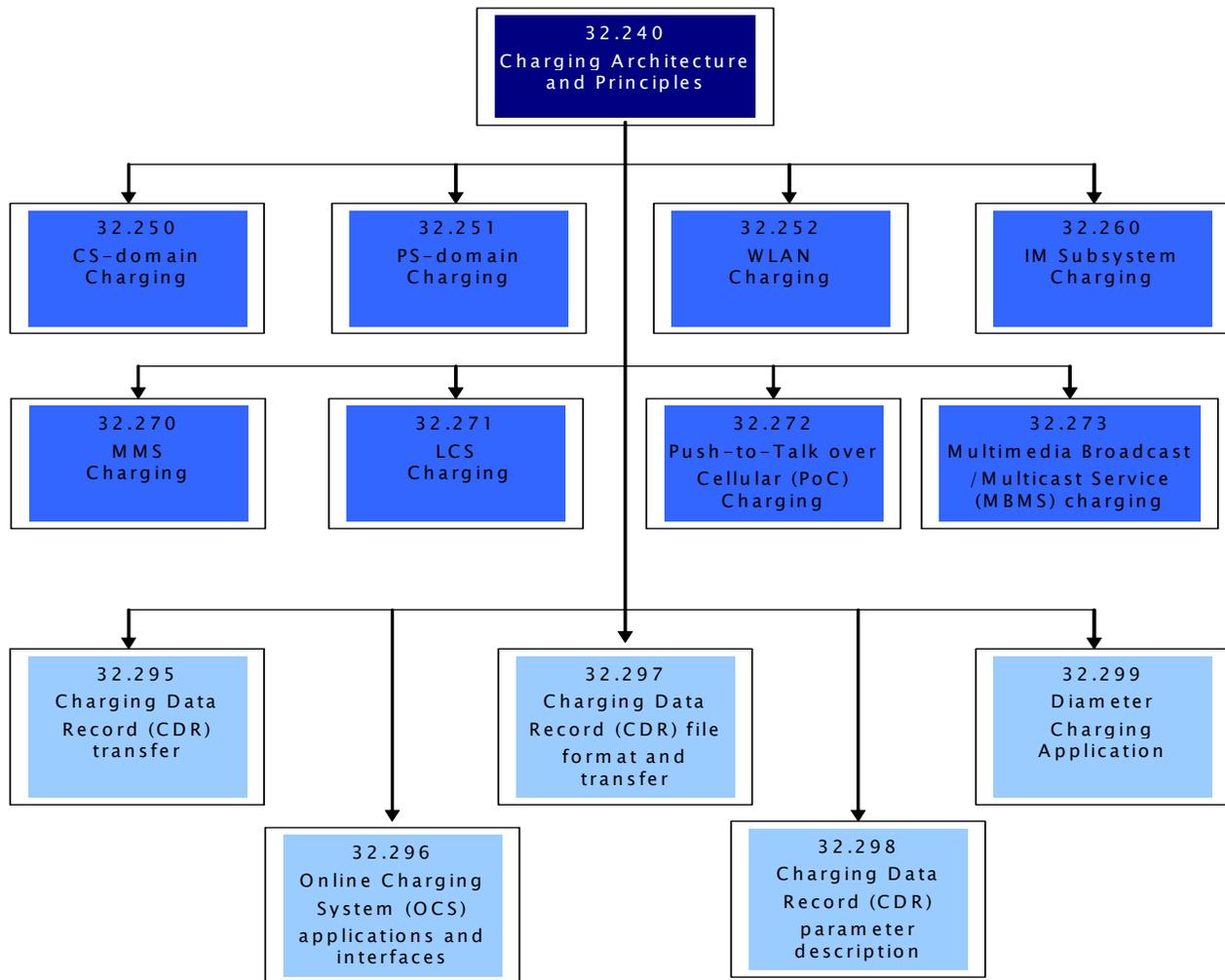


NOTE: Please note that the WLAN architecture is not final and is still under discussion within 3GPP SA5 SWG-B

Figure 2: 3GPP Logical ubiquitous charging architecture and information flows

## 6.1.2 Overview of the Specification Work

3GPP SA5 SWGB is working on number of charging specifications in charging standardization area. An overview of the work can be found in TS 32.240, Charging Architecture and Principles. The document has a figure on 3GPP Charging Documents structure; the figure is also copied below.



**Figure 3: 3GPP Charging Documents Structure**

All the documents in Figure 3 concentrate on a specific 3GPP charging area. The TS 32.240 is the umbrella specification that specifies the high level charging architecture and principles for all the domains and/or services detailed in the other domain/service specific technical specifications. The purpose of 32.240 is to lay down common principles of charging in the network; and to specify a logical common charging architecture that applies to all 3GPP domains, subsystems and services.

The documents TS 32.250, TS 32.251 and TS 32.252 concentrate on the 3GPP specific bearer charging areas (CS, PS, WLAN). The document 32.260 concentrates on charging for the IP Multimedia Subsystem (IMS).

The documents TS 32.270 to TS 32.273 describe the charging of Multimedia Messaging (MMS), Location (LCS) services, Push-to-Talk over Cellular (PoC) charging and Multimedia Broadcast/Multicast Service (MBMS) charging. When additional services will be standardized, a new TS 32.27x specification needs to be created.

The documents TS 32.29x range covers common aspects such as CDR parameter and syntax descriptions, online and offline charging applications, and the charging interactions within the network (CDR transfer) as well as between the network and the Billing Domain (CDR file transfer).

In addition to this 3GPP SA5 SWGB has also a technical report TR 32.815, On-line Charging System Architecture Study. The status of these specifications is listed below:

- TS 32.240, Charging Architecture and Principles [TS32.240]
- TS 32.250, Circuit Switched (CS) domain charging [TS32.250]
- TS 32.251, Packet Switched (PS) domain charging [TS32.251]
- TS 32.252, Wireless Local Area Network (WLAN) charging [TS32.252]
- TS 32.260, IP Multimedia Subsystem (IMS) charging [TS32.260]
- TS 32.270, Multimedia Messaging Service (MMS) charging [TS32.270]
- TS 32.271, Location Services (LCS) charging [TS32.271]
- TS 32.272, Push-to-Talk over Cellular (PoC) charging [TS32.272]
- TS 32.273, Multimedia Broadcast/Multicast Service (MBMS) charging [TS32.273]
- TS 32.295, Charging Data Record (CDR) transfer [TS32.295]
- TS 32.296, Online Charging System (OCS) applications and interfaces [TS32.296]
- TS 32.297, Charging Data Record (CDR) file format and transfer [TS32.297]
- TS 32.298, Charging Data Record (CDR) parameter description [TS32.298]
- TS 32.299, Diameter Charging Application [TS32.299]
- TR 32.815, On-line Charging System architecture study, [TR32.815]

### 6.1.3 Current SA5 SWGB Activities

Currently SWGB is focusing on the following:

- Defining Release 6 charging principles & architecture (within TS 32.240) [especially as Rel-6 introduces the requirement for WLAN and Flow Based charging (Flow Based charging for both GPRS and WLAN)].
- 3GPP is also working towards defining a standard Rating interface (identified as the 'Re' interface).
- Enhancing the Rel-5 3GPP Diameter charging by aligning it to the Diameter Credit Control application.
- Enhancing charging for services such as MMS and LCS.
- Specifying charging for PoC and MBMS.

Latest contributions sent to SWGB meetings (SA WG5 – SWGB) can be found from the 3GPP portal under meetings page [3GPPMeetings].

## 6.2 Status of 3GPP2 TSG-X Charging Standards

### 6.2.1 Overview of Charging in 3GPP2

3GPP2 currently uses to some extent similar notions as 3GPP, but there is currently no general charging model in 3GPP2. Charging is currently defined specifically for the different environments. However, the specific definitions can be understood as instantiations of the more general charging model defined by 3GPP. Further, it is likely that 3GPP2 will adopt the general charging model of 3GPP in the near future.

The numbering of specifications in 3GPP2 is of course different from 3GPP. The relevant specifications for charging in 3GPP2 are listed and explained in more detail in the following sections.

## 6.2.2 Overview of the Specification Work

3GPP2 TSG-X ERA WG edited the S.R0075, Accounting and Auditing All-IP System Requirements, specification published April 2003.

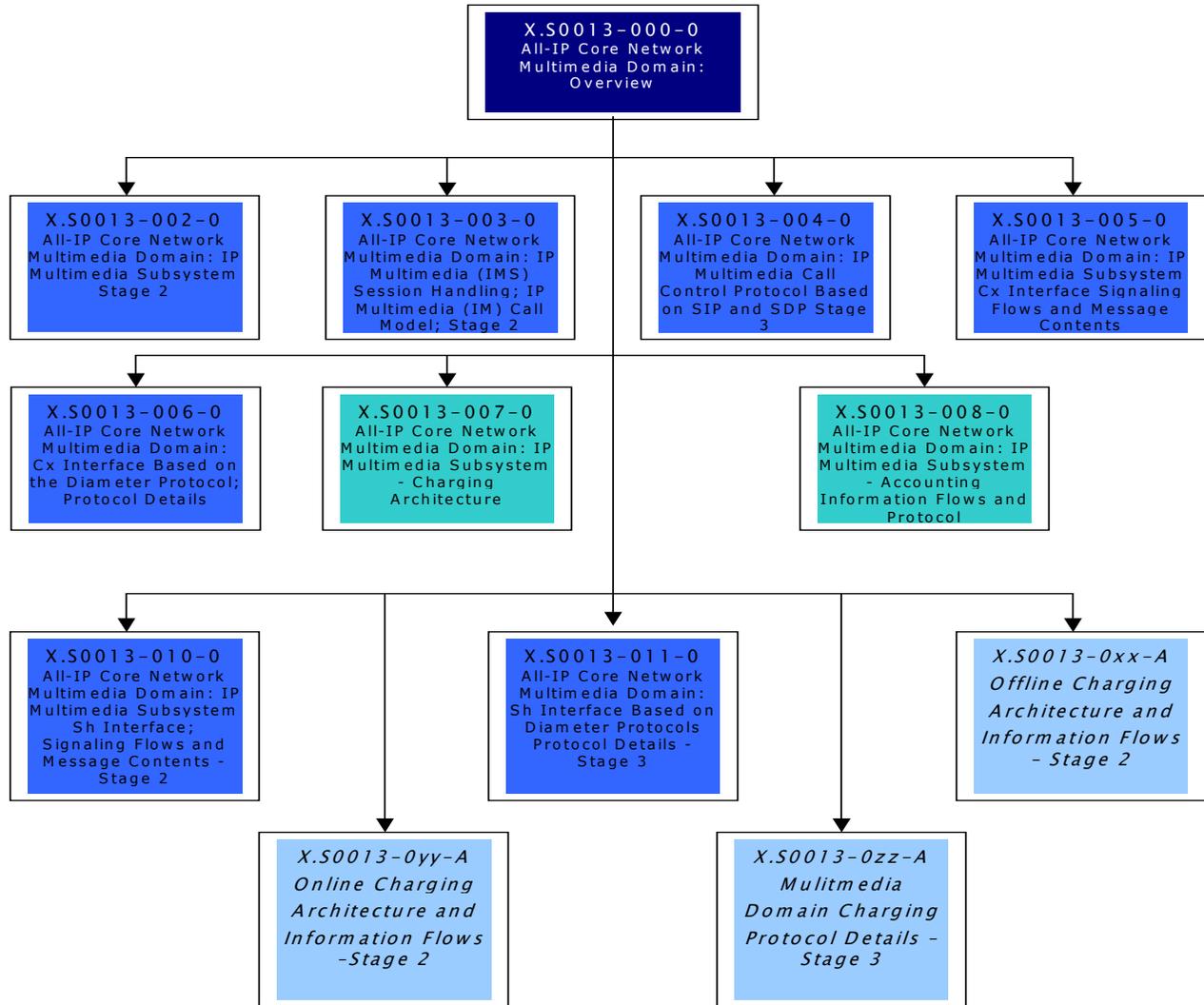
3GPP2 TSG-X CSN WG recently published an enhancement to the WIN Pre-paid Specification, X.S0010-A.

Current 3GPP2 Revision 0 charging documents are X.S0013-007-0 *IP Multimedia Subsystem-Charging Architecture*, and X.S0013-008-0 *IP Multimedia Subsystem-Accounting Information Flows and Protocol*. These documents were organized to roughly align with the 3GPP Release 5 charging standards, and some parts of the 3GPP documents were adapted into 3GPP2 for the purpose of harmonization between the two entities.

3GPP2 TSG-X PSN MMD subgroup is planning work on Revision A charging standards to supercede the current Revision 0 standard. A proposal for Rev A document development is currently under review and the plan is to have a standard available by end the first quarter of 2005. 3GPP2 Revision A Charging will include at a minimum, updated functionality for off-line IMS charging, and for the first time, on-line IMS charging.

3GPP has recently developed a new set of charging standards for release 6 that involved a significant reorganization of documents. In the interest of harmonization, 3GPP2 is considering aligning its Rev A charging documentation to more closely match 3GPP Rel 6 documents. That means that Rev 0 documents will be superceded rather than being updated, because without the realignment, correlating charging functions between 3GPP and 3GPP2 would be difficult.

The following sections describe the current 3GPP2 *All-IP Core Network Multimedia Domain* standards including Rev. 0 Charging and a projection of Rev. A Charging documents. All final decisions for organization and content of the 3GPP2 Rev. A Charging standards rest with the appropriate 3GPP2 standards groups.



**Figure 4: Current 3GPP2 IMS Document Structure**

All the documents in Figure 4 concentrate on the current 3GPP2 All-IP Core Network Multimedia Domain. Within that organizational structure are the Revision 0 Charging standards, X.S0013-007-0, the umbrella specification that specifies the high level charging architecture and principles for all the domains, and X.S0013-008-0, the accounting information flows and protocol specifications. Included are examples of possible Revision A charging documents that are under currently consideration in the TSG-X PSN MMD SWG.

### 6.2.3 Current TSG-X PSN MMD Activities

Currently PSN MMD SWG is focusing on the following for charging:

- Defining Revision A charging principles & architecture which introduces the requirements for On-line charging and Flow Based charging.
- Consideration for adding 3GPP Charging Data Records (CDR) into 3GPP2 charging domain.
- Developing hooks for OMA charging enablers.

Latest contributions sent to TSG-X PSN meetings (MMD SWG) can be obtained at the 3GPP2 web site [<http://www.3gpp2.org/>] under the Meeting Contributions page. Specifications are found at the same web site under the Specifications banner.

### 6.2.4 Current TSG-X CSN Activities

Currently CSN WG is addressing the following in X.P0014 (which will replace N.S0026-A when published).

#### **Autonomous Call Detail Delivery Service**

The autonomous call detail delivery service transfers subscriber activity and facility usage measurement records. No acknowledgment is necessary. Record duplication is not prevented as part of the message transfer service. Each record is normally transmitted only once, although this is not guaranteed.

#### **Autonomous Call Detail Delivery with Certification Service**

The autonomous call detail delivery with certification service reliably transfers records containing subscriber activity and facility usage measurements. Each transmission is acknowledged and retransmitted as necessary. Missing messages are automatically retransmitted. Message duplication is detected to prevent duplicate delivery of call details. The two systems involved in the record transfer keep track of the identifiers used in the transfer for auditing purposes. The messages are saved on the destination system for later reconciliation. If any message is transmitted to the same destination after previously being acknowledged, the message is marked as “repoll” to indicate the sender’s understanding of the message status. The re-sent message shall be identical to the message originally sent, except for the “repoll” indicator. Separate logic shall be applied to detect and correct duplicate record transmission.

#### **Polled Call Detail Delivery Service**

The polled call detail delivery service is similar to the autonomous call detail delivery service, except that the records are transferred upon request rather than autonomously.

The records requested may be based on a range of message identifiers, dates or times-of-day. The scope of the transfer may be limited by specifying one or more subscriber identifiers or serving system identifiers.

#### **Polled Call Detail Delivery with Certification Service**

The polled call detail delivery with certification service is similar to the autonomous call detail delivery with certification service, except that the records are transferred upon request rather than autonomously.

If any message is transmitted to the same destination after previously being acknowledged, the message is marked as “repoll” to indicate the sender’s understanding of the message status. The re-sent message shall be identical to the message originally sent, except for the “repoll” indicator. Separate logic shall be applied to detect and correct duplicate record transmission.

#### **Intersystem Call Detail Rating Service**

This service allows a separate network element to determine the charges and associated taxes for the services used as indicated in one or more call detail records.

## Summary Call Detail Delivery Service

This service allows a collector to determine if records have been accurately received. The record generator periodically sends an aggregate record containing the accumulated totals for a specified range of records. The record collector may then reconcile the accuracy of the transferred records. The collector may request missing records or messages from the generator.

## 6.3 Status of OMA

### 6.3.1 OMA Overview

Open Mobile Alliance OMA is designed to be a focal point of mobile services specification work, to assist the creation of interoperable mobile services across countries, operators and mobile terminals. Through a user-centric approach OMA aims to ensure fast adoption and proliferation of mobile services. The alliance drives the implementation of end-to-end mobile services including architectural frameworks, open standard interfaces and enablers.

A high level explanatory picture of the OMA objective can be seen below in [Figure 5]

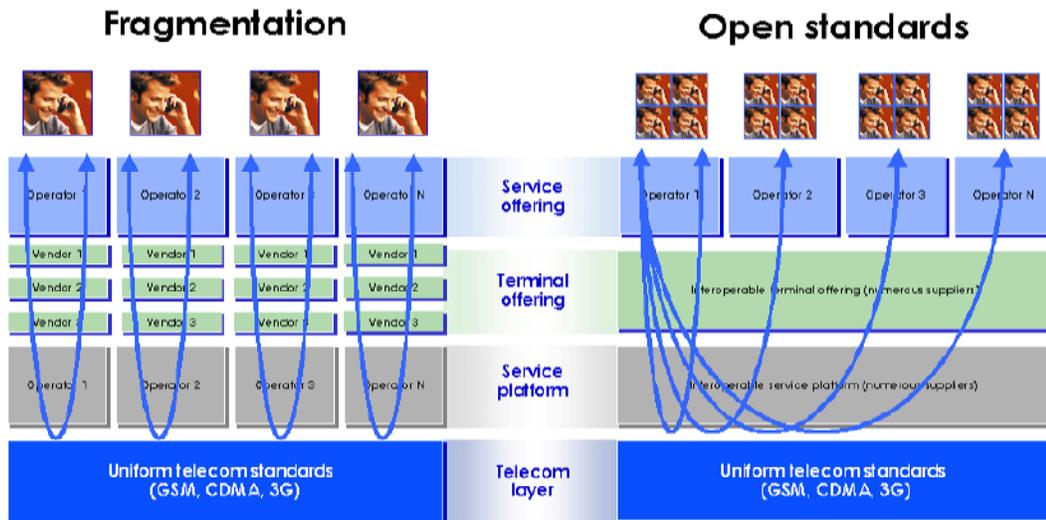


Figure 5: OMA Objective

OMA consists of a number of working groups (WG) where technical work is prepared. Each working group is responsible for one or several enablers, or specifications in a corresponding area of a group's legislation.

When a group has finished a specification and has agreed on it WG internally, the specification is passed for decision making on a top level where the entire participation in OMA are gathered. This deciding organ is the Technical Plenary (TP), which approves group work. The OMA Board of Directors (BoD) makes final endorsement of work done in the OMA. The BoD however, does not make any decisions on technology or functional areas in specifications.

The working group responsible for Charging, Billing and Payments issues in OMA is called the OMA M-Commerce and Charging WG (MCC) which was first chartered in December 2002.

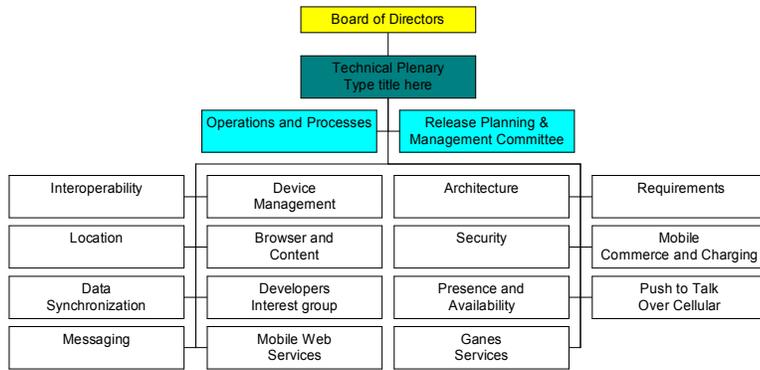


Figure 6: OMA WG Structure

The OMA WG structure can be seen above in [Figure 6]

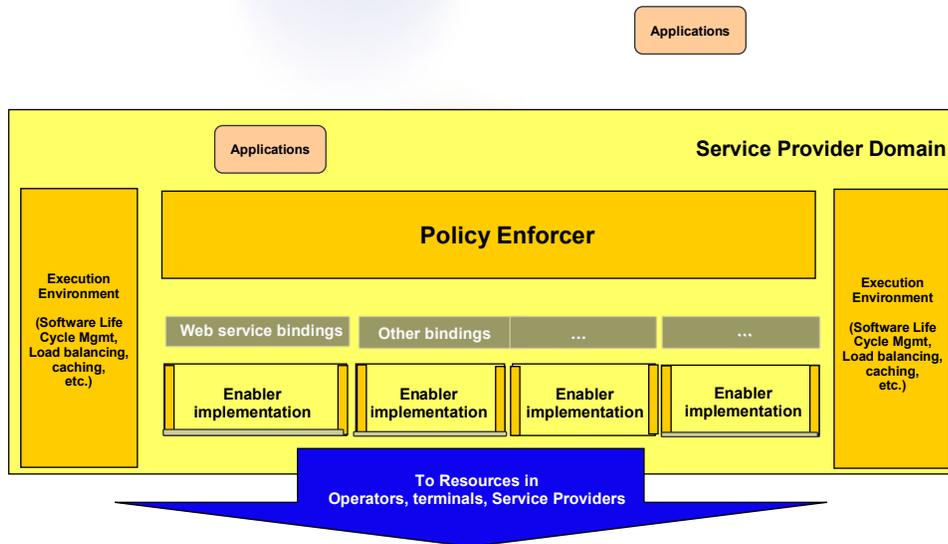
### 6.3.2 Overview of the Specification Work

OMA has recently approved the specification of the OMA Service Environment (OSE). The OSE is the blueprint architecture for OMA enablers and is summarized in section 6.3.2.1 below. The OMA Charging Enabler will define charging within the framework defined by the OMA Service Environment (OSE).

The MCC and the Requirements WG are preparing a requirements document as the basis for a specification on charging. Current activities include analysis of use cases from various sources, and gathering requirements from OMA internal working groups and channelling them into the requirements document work. This requirement is currently in internal review in will soon be approved. The requirements document also contains a description of OMA’s understanding of a business model underlying a charging enabler. This business model is referred to as the “four box model” and summarized in section 6.3.2.2.

### 6.3.2.1 OMA Service Environment (OSE)

## Current view of overall OMA Architecture (OMA Service Environment - OSE)



© 2004 Open Mobile Alliance Ltd. All Rights Reserved.  
Used with the permission of the Open Mobile Alliance Ltd. under the terms as stated in this document.

OMA-MCC-2004-0131

Slide #3

**Figure 7: OMA Service Environment - OSE**

Generally, OMA defines *Enablers*. An enabler is basically a set of specification around a particular subject. An enabler specification may define a particular functionality, which would be provided by an *Enabler Implementation*. An Enabler Implementation is the actual implementation of an enabler in a service provider domain or in a terminal. Often, the Enabler Implementation does not provide the functionality itself, but provides access to some capability in an underlying communication network. The term *Resource* in the OSE denotes network capabilities to which access is provided by an Enabler Implementation.

The counterpart of an enabler is an *Application*. An Application is an implementation of a set of functionality that typically implements a service. Applications typically invoke enabler implementations to perform specific tasks. Apart from Applications, also Enabler Implementations can invoke another Enabler Implementation. This means, Enabler Implementations can be cascaded in order to provide richer capabilities.

The communication between an Application and an Enabler Implementation or between two Enabler Implementations may be intercepted by a *Policy Enforcer*. A Policy Enforcer is an optional element of the OSE. It encompasses a policy-based management mechanism to protect the underlying service provider's resources from unauthorized requests and to manage the use of these resources through appropriate delegation of charging, logging, and enforcement of user privacy or preferences.

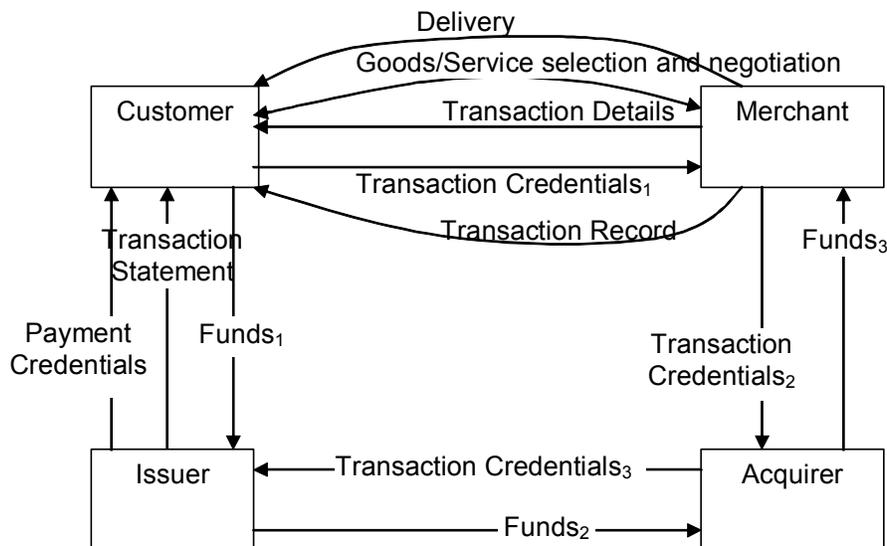
### 6.3.2.2 The Four Box Model

The model that the MCC uses to describe the flow of information in charging scenarios is the general reference model for m-commerce.

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



**Figure 8: M-Commerce Model**

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.

### 6.3.3 Current Activities in OMA and OMA MCC.

In parallel with the above mentioned activity, the MCC is preparing the creation of a charging enabler specification – The objective of this work is to meet the requirements from the charging requirements document. It is anticipated that many requirements identified may already be solved by existing solutions in the infrastructure end and some requirements may need to be passed to organisations like the 3GPP/2 to make refinements to existing specifications. The charging enabler specification from OMA does not intend to specify yet another “new charging solution”, but rather seek to generate a set of rules for what information, and how OMA enablers should provide a charging system. The goal is also to provide guidelines for how OMA enablers should interface with existing solutions that are already in place. The above requires a lot of cross WG work inside of OMA, and a lot of work closely with organisations like the 3GPP and 3GPP2

### 6.3.4 What OMA MCC intends to do in the future?

Once a stable functionality of producing and relaying relevant charging data from the OMA enablers have been achieved, there is a continuous need for coordination in the field of maintaining this stability. In the area of the charging enabler specification, the MCC must seek to provide maintenance support.

If new functionality is introduced, or when new enablers are produced in OMA, the charging enabler specification is to be used as a guide on how to enable charging for the new functionality. In the longer term, the goal is to reach interoperability between solutions using OMA enablers in the area of charging.

## 7. Relation between 3GPP/2's charging model and the OMA Service Environment

OMA MCC currently assumes that the general charging model, as developed by 3GPP and summarized above, shall be adopted by OMA.

As a consequence, a mapping needs to be provided for the environments defined by OMA. As a first step, this exercise has been done the OMA Service Environment (OSE) as defined in the OSE specification. In a next phase, the mapping could be refined to apply to the specific environments defined by OMA, such as the presence enabler or the location enabler.

The mapping of 3GPP's general charging model onto the OSE is illustrated in the following diagram. The diagram is based on the original OSE diagram as introduced in OSE specification. This diagram has been complemented with the entities from 3GPP's general charging model, which are shown in red.

### Relation between 3GPP/3GPP2 Charging Model and the OMA Service Environment

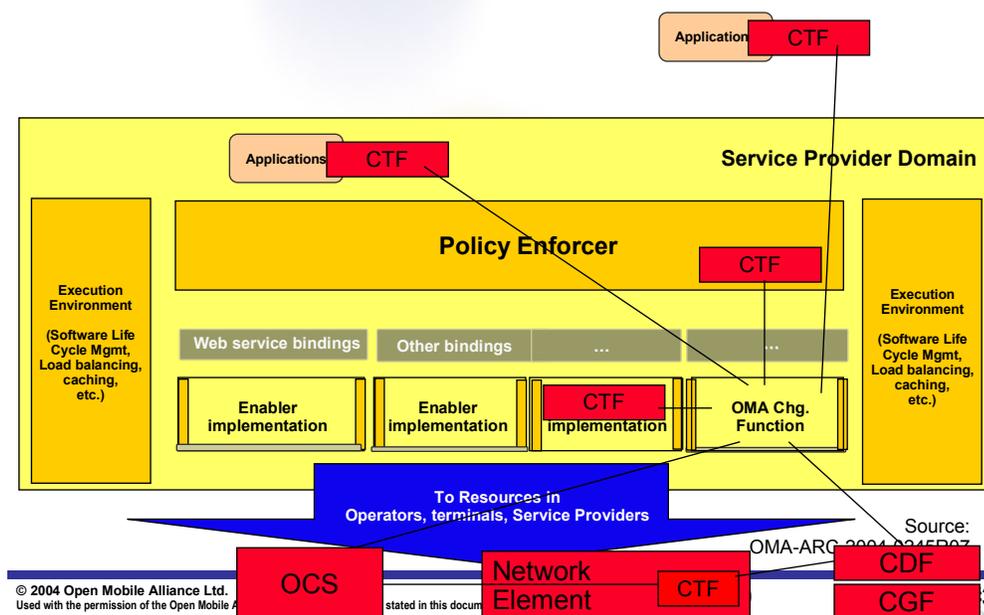


Figure 9: 3GPP/2 Charging Model and OMA Service Environment

Remember that 3GPP's general charging model consists of a network element, a CTF associated with the network element, a CDF, a CGF, an OCS, and a Billing Domain.

From an OSE perspective, the 3GPP-defined entities CDF, CGF and OCS are considered as *Resources* belonging to an underlying network and therefore are shown at the very bottom of the OSE diagram, underneath the blue arrow that represents interactions between OSE entities and the resources in an underlying network.

Note: The OSE specification defines a resource as follows: "A *Resource* in this document [the OSE specification] is an abstract concept that represents a capability, e.g. a network element, in a Service Provider's domain. In the OSE, an enabler implementation may directly invoke or access a resource."

Within the OSE, entities called *Enabler Implementations* create the linkage between Resources (which are not part of the OSE) and the actual OSE entities. These Enabler Implementations expose interfaces to the Resources that can be invoked by the OSE entities. Thus, a specific instance of an Enabler Implementation is introduced for charging. It is shown in the diagram as *OMA Charging Function*.

Note: According to the OSE specification, “The *enabler implementation* may amalgamate, abstract and/or repackage a resource, and present its functions through an interface after binding to a particular syntax.”

Within the OSE model, the following entities are expected to generate charging information: *Applications* (both within and outside the Service Provider Domain), the *Policy Enforcer*, and some *Enabler Implementations*. They are similar to a network element in the 3GPP model. Thus, CTF instances are shown within the Applications, Enabler Implementations, and the Policy Enforcer. Unlike in the 3GPP model, the OMA CTF’s connect to the OMA Charging Function rather than directly to the OCS or CDF. In case of the CTF associated with an application, the Policy Enforcer will intercept the communication with the OMA Charging Function, if a Policy Enforcer is present in a particular deployment.

Another network element, which contains a CTF and feeds the OCS and the CDF with charging events, is shown as part of the underlying network. This network element could represent any of Non-OMA SIP-AS, MRFC, MGCF, BGCF etc. as shown in the previous diagram and is shown here only for completeness. It illustrates that CTF’s contained in OMA entities and CTF’s within the underlying network behave very similar and can feed a single CDF and/or OCS.

The Billing Domain from the 3GPP model is not shown but would belong underneath the OCS and CGF and would have connections to them.

## 8. Principles

Since OMA applications are intended to inter-operate with 3GPP and 3GPP2, and potentially other, networks, a high degree of cross-organizational coordination is required in developing charging specifications for OMA applications. The following figure illustrates the split of responsibility between OMA and 3GPP/3GPP2 for Stage 1, 2, and 3 related to charging aspects of OMA applications. It has been agreed that PoC v1.0 charging will be handled as a special case, and the charging specification for PoC v1.0 will be created in 3GPP SA5 swgb and reviewed by OMA MCC. It has been agreed that PoC v1.0 charging will be handled as a special case, and the charging specification for PoC v1.0 will be created in 3GPP SA5 swgb and reviewed by OMA MCC.

Much of the shared responsibility takes the form of cross-organizational document review to ensure end-to-end consistency in the OMA specifications. However, where required to support an OMA application implemented on a 3GPP or 3GPP2 network, that organization may have additional responsibility in defining its own network specific requirements or protocol enhancements.

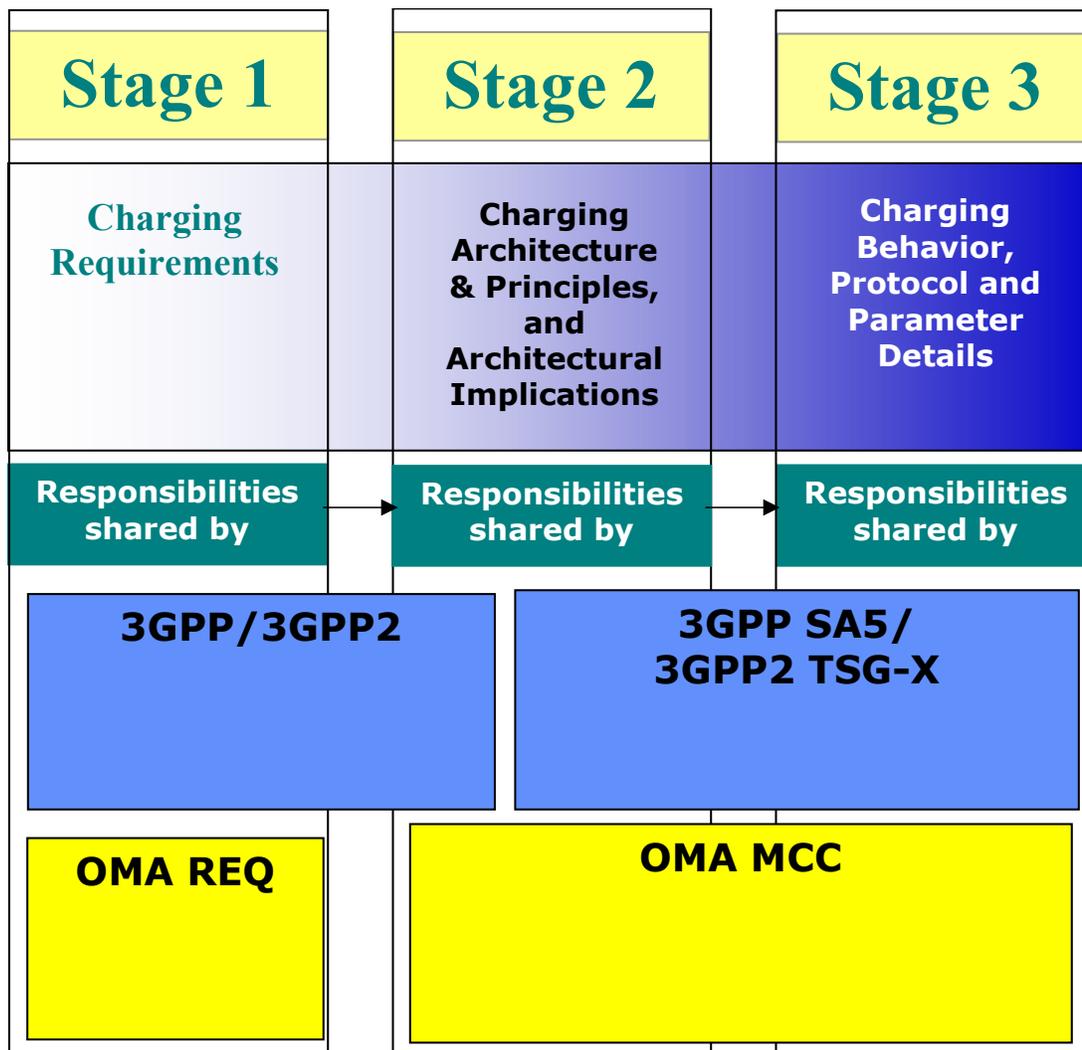


Figure 10: 3GPP, 3GPP2 and OMA Working Principles

Stage 1 Charging Requirements are defined by the respective requirements group of each organization. While OMA has principle responsibility for requirements related to OMA applications, 3GPP and 3GPP2 are involved in reviewing those requirements and may introduce their own network-specific charging requirements. These requirements may be included in the related OMA RD(s). The OMA Charging Requirements document includes high level charging requirements generally

applicable to OMA applications. The individual requirements documents for each application may include additional, application specific, charging requirements.

Stage 2 Charging Architecture is the responsibility of OMA MCC. This includes defining a high level charging architecture consistent with OMA's OSE and the charging aspects of individual OMA applications as well as coordinating with 3GPP and 3GPP2 for consistency with their respective architectures. The sharing of responsibility shown in the figure includes not only architecture review but also the series of joint OMA/3GPP/3GPP2 charging workshops that have facilitated development of a high level charging architecture. Architecture work may be divided among multiple groups within 3GPP and 3GPP2; however, this document does not address their internal structures. 3GPP, and 3GPP2 are responsible for network specific charging architecture creation - eg. IMS, PS, CS. OMA MCC is responsible for the definition of charging architecture of OMA application/services. For application/services that are defined both in OMA, and 3GPP, 3GPP2 coordination is especially important. e.g. SIP (IMS) based services.

Stage 3 While OMA MCC is responsible for developing any protocol enhancements needed to support OMA charging, such enhancements will be coordinated with 3GPP and 3GPP2 to maintain backward compatibility with those specifications.

For any charging output from OMA, interfacing to a 3GPP charging system the Ro, and Rf interfaces shall be used. Any possible enhancements to the protocol will be coordinated, and requirements for Ro, and Rf (stage 1, 2, 3) will be communicated with the 3GPP. The 3GPP is then responsible for the protocol enhancements.

For any charging output from OMA, interfacing to a 3GPP2 charging system the Ro, and Rf reference points may be used. Any possible enhancements to the protocol will be coordinated, and requirements for Ro, and Rf (stage 1, 2, 3) will be communicated with the 3GPP2. The 3GPP2 is then responsible for the protocol enhancements.

The statement above does not limit OMA to use only the Ro and Rf interfaces. When OMA interfaces with other networks or infrastructures, this work is outside the scope of this document to discuss or clarify.

## 9. Recommendations

It is recommended that OMA MCC maintain a high level of coordination with 3GPP/2 during the development of the charging enabler. As illustrated in section 8 of this document, the charging responsibilities of the various groups are closely inter-related. Regular communication will be essential to ensure the charging specifications of the various groups are aligned to support charging for OMA applications accessed in a 3GPP/2 system. The involved bodies are expected to work cooperatively according to the work split principles as described in section 8 of this document, maintaining a high degree of alignment.

## Appendix A. Change History

Document Identifier	Date	Sections	Description
OMA-WP-Charging_Worksplit-20040917-D	17 Sep 2004	All	Initial version of WP as permanent document.
OMA-WP-Charging_Worksplit-20041129-D	29 Nov 2004	All	“annotated OSE” (as described in OMA-MCC-2004-0168) has been considered, Section 7 about “Relation between 3GPP/3GPP2’s charging model and the OMA Service Environment” has been added.
OMA-WP-Charging_Worksplit-20050110-D	10 Jan 2005	8	Introduction of new text in section 8 (from change request OMA-MCC-2005-0006-LATE-Comments-to-004-on-Section-8).
OMA-WP-Charging_WorkSplit-20050214-D	14 Feb 2005	All	Introduction of change requests OMA-MCC-2005-0029R01- section_8_of_worksplit_doc_for_comments OMA-MCC-2005-0030-LATE-Scope-of-Worksplit-Document OMA-MCC-2005-0031-Work-Split-Recommendation OMA-MCC-2005-0043-Update-to-Work-split-on-3GPP-status
OMA-WP-Charging_WorkSplit-20050222	22 Feb 2005	3, 6.3.2.2,	New terms and abbreviations. Chapter 6.3.2.2 updated due to faulty reference.