Accounting Context: Applications and Issues

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Contents

1 Introduction

In this document, we provide a context for accounting and billing functionality to support Internet-based services.

In the “Policy-based Accounting” draft [2], accounting is positioned within the generic AAA framework [6]. In this document, we will provide a broader context for accounting: how does accounting, charging, billing and payment functionality support the financial exploitation of a wide variety of Internet-based services? Based on a number of practical applications, we identify a number of important issues and problems related to accounting.

(* Relation with AAA Context document [3] *)

1.1 Services

Accounting, billing and payment functionality aims to support and enable *exploitation of Internet-based services*, either commercially or on a non-profit basis. Therefore, if we want to consider these types of functionality in a meaningful way, it is necessary to also consider the services that they support: these services provide the *context* for accounting, billing and payment.

(* Definition: what exactly do we mean by “service”? *)

1.1.1 Views on services

(* Which roles do we distinguish in service provisioning? *)

(* *Functionality* and *content* *)

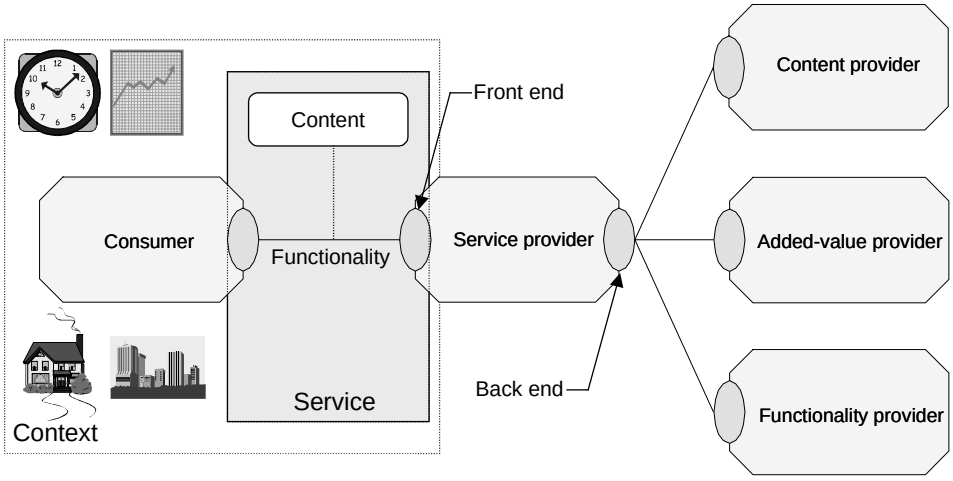

Figure 1. Elementary service provisioning model

1.1.2 Types of services

(* *Layer-to-layer* service versus *peer-to-peer* service *)

(* Metering and accounting can be done at network, middleware and application level *)

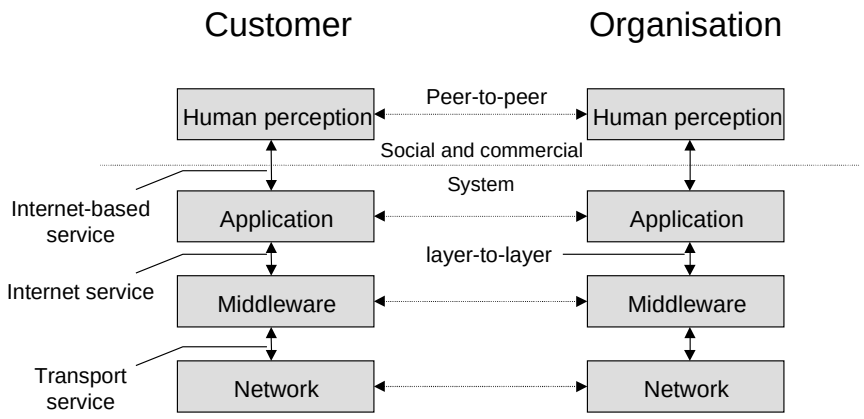

Figure 2. Different views on services

(* Layer-to-layer services can be further classified into transport, Internet and Internet-based services. Examples of Internet services are FTP and e-mail. Internet-*based* services are for example video on demand, on-line auctions and audio/video conferencing over the Internet. *)

1.1.3 How to describe the structure of a service

(* Use-cases? Hierarchical description (tree)? *)

2 Example applications

2.1 Video over IP: content-based billing for streaming video

In a demonstrator built for the Video over IP (VIP) project, content-based and service-based charging and billing is applied. A *video portal provider* (VPP) handles most of the user interactions (e.g., choice of a video), while a separate deployment provider takes care of the actual streaming of a video.

2.1.1 Roles

Accounting, charging and billing (AC&B) is outsourced to a special-purpose AC&B-provider, and a separate payment provider handles payment. Pricing takes place at the video portal provider. Figure 3 shows the roles involved in this example.

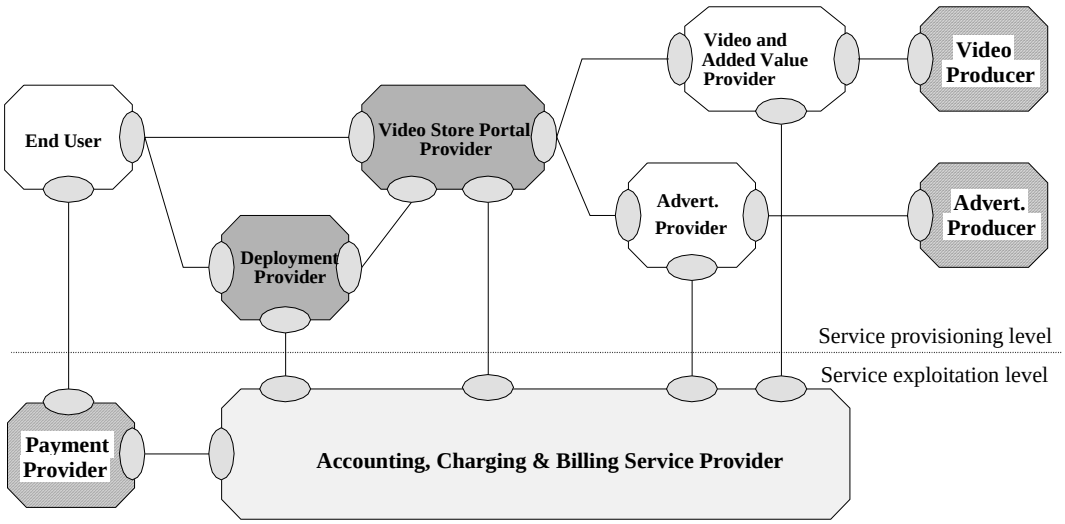

Figure 3: Business model for an on-line video store service (VIP project)

2.1.2 Design of the accounting, charging and billing service

Figure 4 shows a simplified design of the AC&B service.

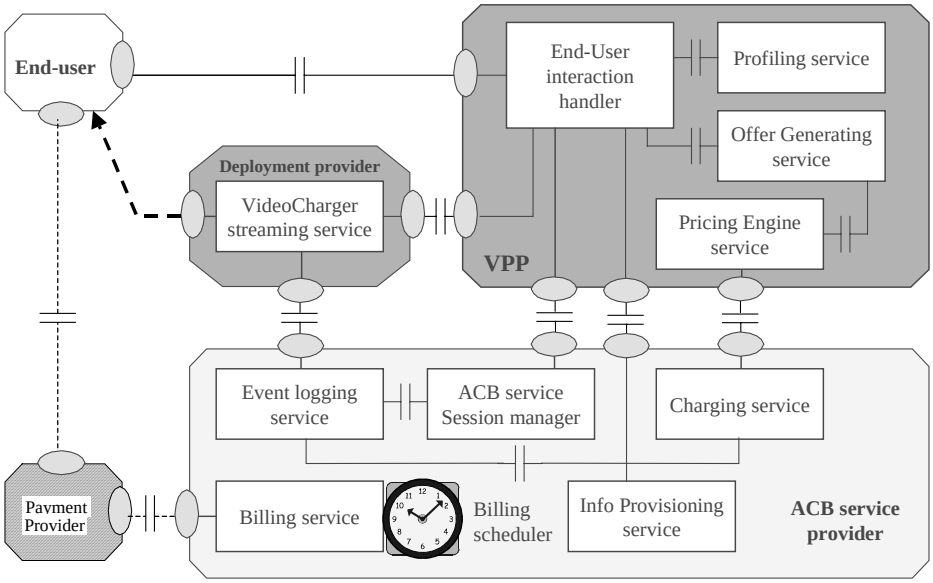

Figure 4: Design of the VIP accounting & billing service

2.1.3 Charging scheme

Figure 5 shows the structure of the streaming video service in terms of chargeable service units and content units, and suggests how charges can be assigned to each of these chargeable units. This can be used as input for the design of AC&B functionality to support this service: e.g., it indicates where metering might be required.

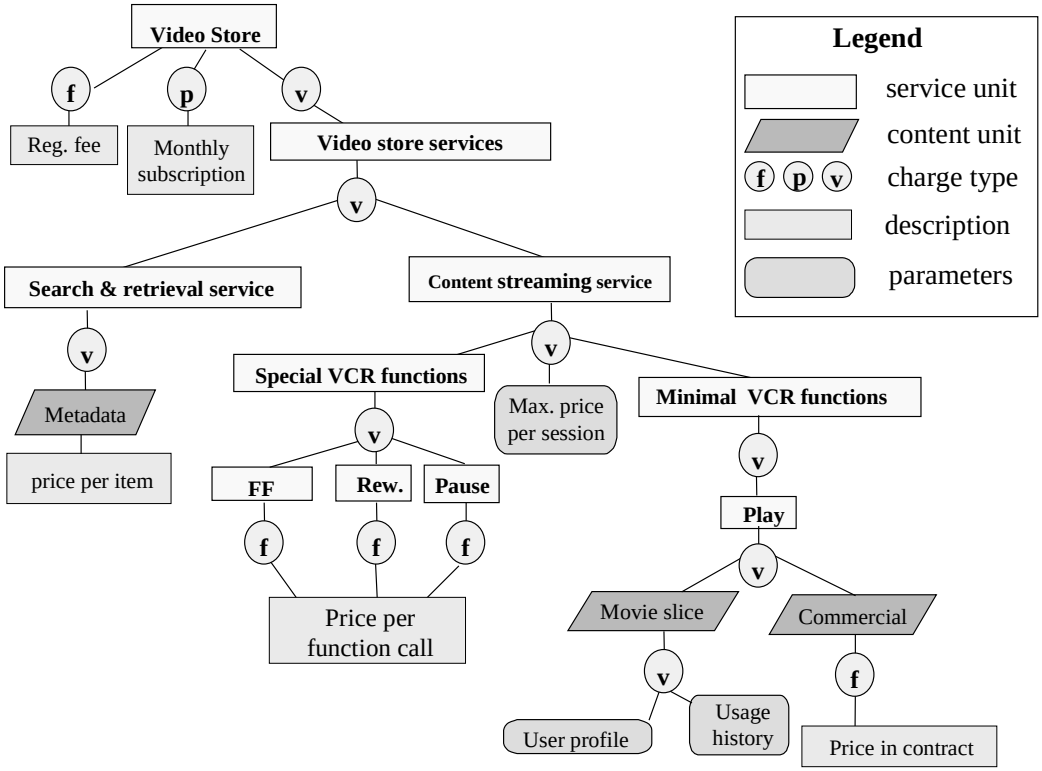

Figure 5: Charging tree for the VIP streaming video service

2.1.4 Issues that arise from this example

This example application brings up several issues related to accounting that need further study:

- Two servers: web server at the VPP and streaming server at the deployment provider.
- Session management: how to link a streaming session with a session at the VPP? What is the role of session IDs?
- How can this system be audited?
- Where does metering take place?

3 Roles and relations between roles

Figure 6 gives an overview of the different parties (roles) that may interact with a "financial exploitation" (FinEx) system. For each of these roles, we specify possible types of interaction with the system.

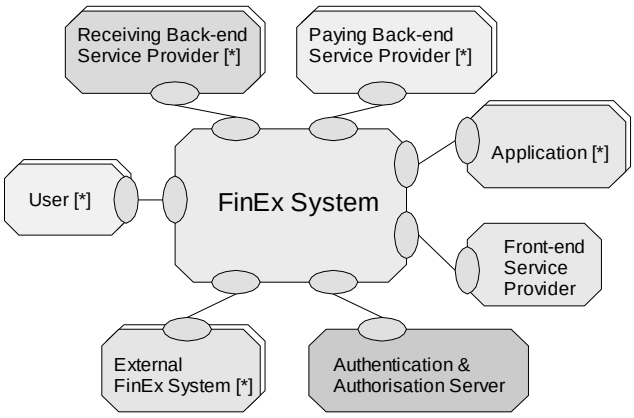

Figure 6. Interaction of the different roles with the financial exploitation system

3.1 User

3.2 Front-end service provider

3.3 Back-end service provider

3.4 Application

3.5 Authentication and authorisation server

3.6 External FinEx system

4 Required functionality

(* Work in this chapter partly based on [5] *)

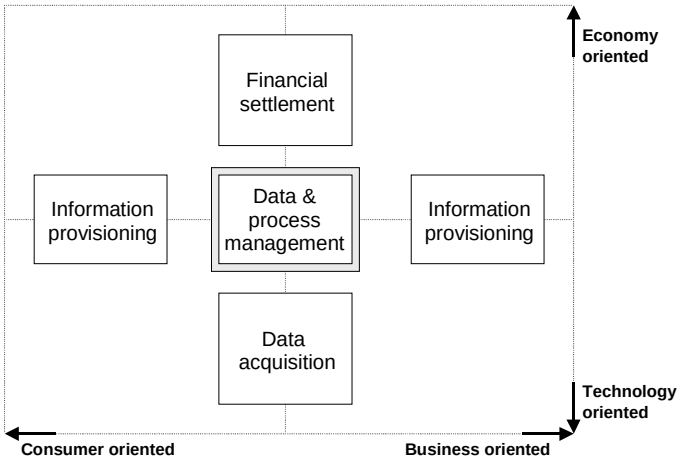

Figure 7. Positioning of main financial exploitation functionality

4.1 Functional model

Figure 8 shows the main functions that play a role in the financial exploitation of services, as well as their dependencies: which functions provide input for which other functions? We will briefly describe each of the functions.

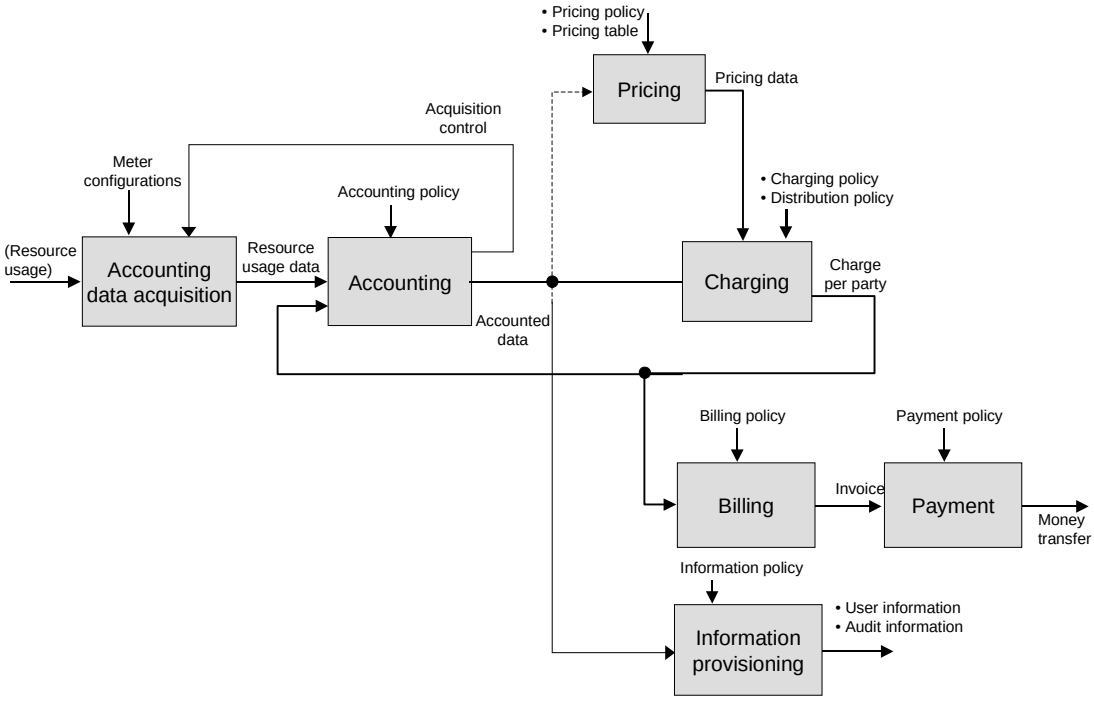

Figure 8. Functional components and their dependencies

4.1.1 Accounting

Accounting is, in several ways, the “heart” of the FinEx system. It is responsible of storage and management of accounting data, as well as for the management of several other processes, in particular the data acquisition. The accounting function is responsible for providing the accounting data needed for charging and billing, but also for the purpose of information provisioning to users and auditing. We can subdivide the accounting function in several subfunctions, e.g.:

- *Acquisition management*: retrieval, validation and storage of events or metering data. This includes the association of usage data with the corresponding users, and will often require close interaction with (external) authentication (and possibly authorisation) functionality.
- *Archive management*.
- *Account management*, for managing user’s accounts, storing information obtained from charging.
- *Data access control*, the distribution of accounting data to the functions using this data. This requires a strong interaction with authorisation and authentication, to determine which information may be provided.
- *Session management*, including the handling of session IDs.
- *Timing*, e.g. for triggering the retrieval of metering data (in case of a “pull” model).
- *Configuration*, e.g. of the metering hierarchy.

4.1.2 Accounting data acquisition

The *Accounting data acquisition* function provides resource usage data for accounting purposes. Acquisition control, coming from accounting, and meter configurations, steer this function. The accounting data acquisition function can be refined into a *Metering* function and a *Collecting* function.

4.1.3 Charging

The *Charging* function computes the charge per party based on the data obtained from accounting. As control data, this function uses a charging policy, a distribution policy (how is the charge distributed over the involved parties?) and pricing data, coming from the pricing function.

4.1.4 Pricing

The pricing function determines the price to be charged for service usage, thus providing input for the charging function. In the case of *dynamic* pricing, the price depends on information from the system, which is provided as an input to the pricing function through the accounting function. More common is *static* pricing, in which case prices are usually specified in a *pricing table*.

4.1.5 Billing

We subdivide the billing function in *Bill preparation*, the creation of an actual (traditional or electronic) bill, and *Bill presentment* to the party that is to pay the bill.

4.1.6 Payment

4.1.7 Information provisioning

The information provisioning function offers information based on accounting data to the different types of users of the FinEx system, not directly related to billing and payment.

4.2 Policies

4.3 Relation with the generic AAA architecture

(* How do these functions fit in the generic AAA architecture described in [6]? Relation with the Policy-based Accounting draft [2] *)

5 Relation with authorisation and authentication

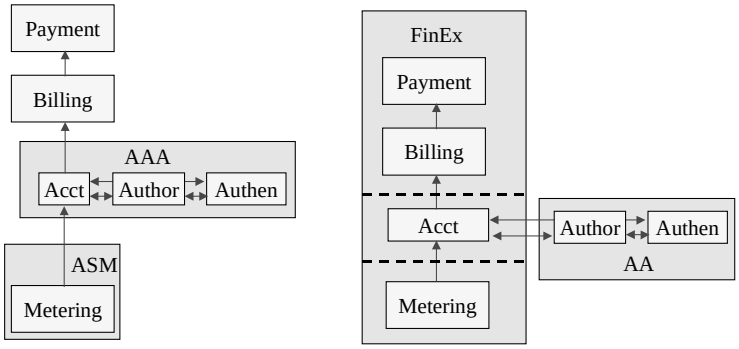

Figure 9. Two views of relating accounting to authentication & authorisation and to the billing street

5.1 Authentication and authorization requirements for accounting

Some issues:

- How to share authentication and authorization information between servers.
-

5.2 Accounting information as input for authorisation

(* Typical example: service usage is only authorized if a certain usage limit has not yet been reached, or if the balance on the user's prepaid account is sufficient *)

6 Inter-domain accounting issues

6.1 Distribution of functionality over domains

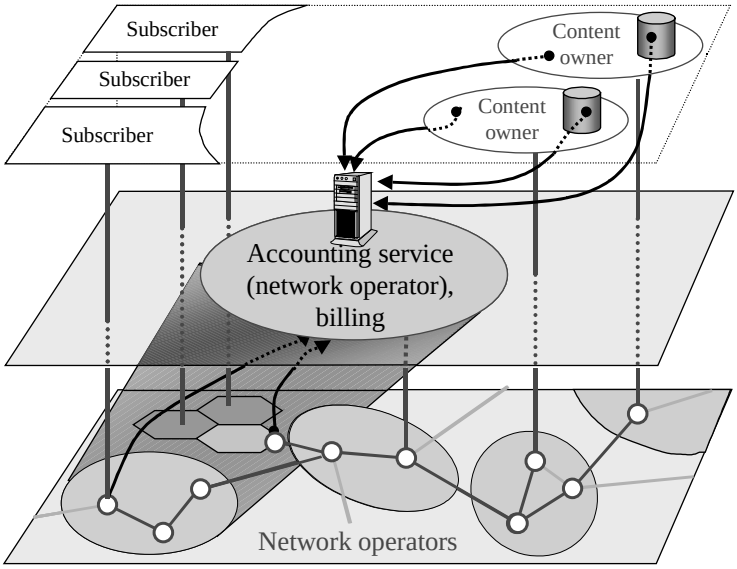

Figure 10. Centralized accounting & billing

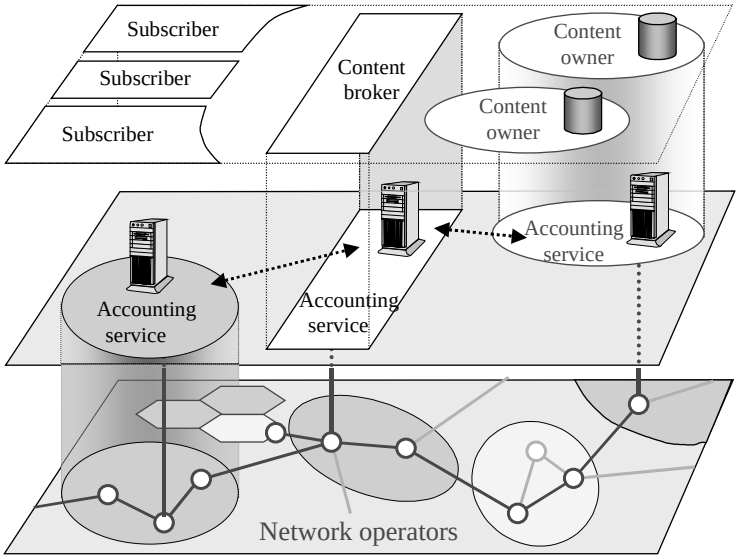

Figure 11. Distributed accounting & billing

6.2 Relation with generic AAA architecture

(* Also here we will pay explicit attention to the questions: How do these functions fit in the generic AAA architecture described in [6]? What is the relation with the Policy-based Accounting draft [2]? *)

References

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[2] Carle, G., S. Zander and T. Zseby, *Policy-Based Accounting*, Internet Draft, Sept. 2000.

[3] Gommans, L.H.M. and E.W. de Bruijn, *Generic Authentication, Authorisation, Accounting*, Sept. 2000.

[4] Hartanto, F. and G. Carle, "Policy-based billing architecture for Internet differentiated services", in *Proceedings IFIP Fifth International Conference on Broadband Communications*, Hong Kong, 10-12 November 1999.

[5] Hille, S.C., H. Jonkers, A. Tokmakoff and M. Wibbels. *Taxonomy of Accounting, Billing and Payment Concepts*, Giga Accounting, Billing and Payment Project, GigaABP/D1.2, Telematica Instituut, Enschede, the Netherlands, March 2000.

[6] Laat, C. de, G. Gross, L. Gommans, J. Vollbrecht and D. Spence, *Generic AAA Architecture*, RFC2903, August 2000.