
Report 21 from the UMTS Forum

Charging, Billing and Payment Views on 3G Business Models

This report has been produced by the UMTS Forum, an association of telecommunications operators, manufacturers and regulators. The UMTS Forum comprises IT and media industries interested in broadband mobile multimedia that are active both in Europe and other parts of the world and who share the vision of UMTS (Universal Mobile Telecommunications System). These are key industry members of the Forum and have contributed significantly to this report. In terms of a technology platform UMTS will move mobile communications forward from today's environment to the Information Society incorporating third generation mobile services that will deliver speech, data, pictures, graphics, video communication and other wideband information direct to people on the move. UMTS UTRA (Universal Terrestrial Radio Access) is a member of the IMT-2000 family of standards.

This report has been generated by one of the UMTS Forum Working Groups, the Information and Communication Technologies Group (ICTG), which addresses the issues of Services and Applications, Devices, Billing & Charging and Content for the deployment of UMTS / Third Generation networks.

Report 21 is one of the family members of UMTS Forum reports. It deals with Charging, Billing and Payment Views on 3G Business Models. Other outputs from the Forum cover technical aspects, economic conditions, and licensing issues.

The views and conclusions in this Report are purely those found and expressed during the work of creating this document and exempts National Administrations who are UMTS Forum members from being bound to them.

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1. EXECUTIVE SUMMARY

The vision for 3G is largely based on the advent of new, demanded and useful services. A clearly defined competitive landscape will facilitate the launch of 3G services.

By defining probable business models and the related revenue streams we can determine where standards are required to overcome vendor-specific solutions. This will prevent interoperability problems and allow fair competition between service providers as well as vendors. Ultimately this is also an advantage for the end user.

Particular areas that are subjects for standards are, for example, interfaces between Content Providers and Service Providers. Standards are required in order to exchange relevant charging information between these players. Charging protocols or similar devices concerning the availability and the exchange of real-time charging and authorisation information are also required. This is particularly important for roaming scenarios. Charging information has to be available from the Network Elements or from the Application Servers through to the Billing Systems.

In this report we define the different roles in the 3G market place. Depending on local and regional market conditions, different players in different communities will take over these roles. They all have to find their position in the value chain. For example, Service Providers and Content Providers have to agree on their respective roles for each of the business models.

We have identified a number of business issues that need to be addressed regarding settlements between these players. The UMTS Forum ICT Group is currently working on a separate report that will include further details on these issues.

We also believe that trust is a critical success factor for 3G, both from the service provider and end-user perspectives. Trust is a key to success or failure, as a large proportion of forecast revenues is based on new services that are not currently available. If trust is lacking the result will be lack of content and, in all cases, a lack of use. This means that the design of the authorisation and payment infrastructure is very important.

Quality of service and scalability are areas not directly addressed in this report. However we do raise the question of what level of quality will be acceptable to the customer. Does the customer have realistic expectations of the quality of service? If not, then services will fail to be taken up. 3G networks will not initially provide quality of service parameters, which have to be considered in the post-processing environment.

2. INTRODUCTION

This document is one of a series of UMTS Forum reports that address different aspects of an overall complex system. Applications and services are essential components of future cellular networks. They will be the main competitive differentiators and sources of increased revenue for operators and service providers.

The goal of this report is to define Charging, Billing and Payment aspects of 3G services. In order to reach concrete conclusions we have identified a number of different roles involved in providing those services, as well as some probable business models.

This report therefore focuses mainly on charging, billing and payment aspects as applied to some probable 3G business models. Identifying the key roles to be played in the 3G market environment also highlights the areas where standards and open interfaces are required.

The structure of the report is as follows:

Section 3 describes the roles that interplay to provide 3G services.

Section 4 describes three probable 3G business models.

Section 5 describes pricing principles in 3G.

Section 6 describes 3G requirements concerning payments.

Section 7 describes 3G requirements on settlement management.

Section 8 describes 3G roaming requirements.

Section 9 presents Conclusions: critical success factors for billing.

Appendix A presents a summary of 3G charging attributes.

Appendix B summarises some critical definitions used in the document.

Appendix C presents a glossary of terms.

3. ROLES THAT INTERPLAY FOR PROVIDING 3G SERVICES

A core part of this report is to describe some probable business models. However, to define those models we first have to examine the different roles involved in providing 3G services.

3.1 ROLE DEFINITIONS

We limit the definition of roles as follows:

- Roles define the functions and responsibilities that are carried out.
- The role model shown does not imply the business or operational scope of organisations. One organisation could operate one or several roles.
- Note that a “service provider” is not a “role” but an organisation that plays one or more roles.

The names of the roles used in this report may resemble typical definitions for organisations and companies seen in the telecommunications market today, but they should be regarded as roles only. In Section 4, where the business models are presented, the identified roles are combined into probable business entities.

The roles we have identified as important for 3G services are the following:

Network Operator (NO). The key function of the network operator is to provide access and transport services. A network operator is typically a 3G licence holder.

Content Aggregator (CA). A content aggregator could perform the function recognised today as a mobile portal. The key function of the content aggregator will be to package and offer services from one or several content providers.

Content Provider (CP). The role of the content provider is to provide services (“content” or applications) that add value to access and transport services. Value-added services can be produced by the content provider itself or purchased from others.

Billing and Collections Provider (BCP). A billing and collections provider issues bills (or the equivalent) and arranges for collection of payments from customers. As illustrated by the scenarios in this report, the BCP will handle both prepaid and postpaid billing arrangements. In most cases the BCP will also handle Authentication, Authorisation and Credit reservation (AAC), in particular for prepaid arrangements where the AAC function will happen in real time. (In a roaming scenario another party may be involved in AAC management.)

Financial Institution (FI). Financial institutions handle financial transactions such as payments on behalf of other organisations. Organisations that carry out this role are usually described as banks, credit card or e-payment companies. In most countries a financial institution is classed for regulatory purposes as a bank. In other words it must hold a banking licence. This licence imposes certain regulatory requirements; for example the organisation must “know their customers”. This requires banks to identify their customers in a much stricter way than, say, a network operator or content

provider.

Clearing House (CH). A clearing house communicates the roaming records and/or settlements between visited and home domain “parties”. Its role is explained further in Section 8.

Authentication, Authorisation and Credit reservation (AAC). See comments to the BCP role above. AAC may be a separate role in roaming scenarios (see Section 8).

There are certainly other roles to be played that will also be found in the market. The following three roles are described briefly in Section 4.3, but they are intentionally not covered explicitly in the business model examples.¹

Resellers are called service providers in some markets and perform the function of an agent between the network operator and end customers.

Advertisers offer advertisements or sponsored services.

Content Owners do not interact directly in providing services, but they will interact with content providers and may have bilateral agreements with them.

3.2 3G ROLE RELATIONSHIPS

In this report the relationships between the various roles are analysed from four important perspectives or aspects:

- The branding and customer care relationship, where the customer agreement is placed.
- Service delivery, where the service may be information or data, an application or a commercial transaction.
- Authentication and authorisation of the customer, including policy and verification that a necessary balance or credit is available (for a postpaid or a prepaid service).
- Invoice, payment or settlement, for example generation of a chargeable event or payment / settlement for the same.

Once again, the roles and their relationships should not be confused with the business entities. In Figures 3.1 through 3.4 we define the interfaces between the roles from these perspectives. In this section we have neglected roaming scenarios, these are covered in Section 8.

¹ In order to limit the scope of this report.

3.2.1 Branding and Customer Care Perspective

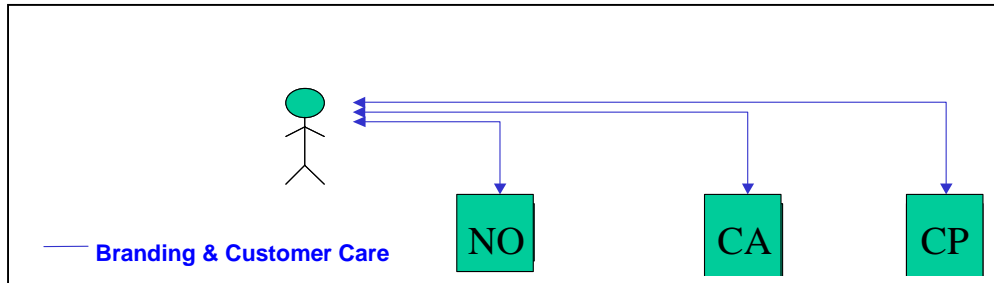


Figure 3.1: Branding and Customer Care Perspective

Before a service is offered an agreement between the customer and a service provider will normally exist, for example as a subscription. In our business model scenarios, this agreement could be between the customer and the network operator, content aggregator or content provider roles (Figure 3.1). A customer may have multiple agreements. Service providers will have to position their brands and provide customer care facilities in order to attract customers. The service provider brand will typically be what is printed on the customer invoice. There may however exist cases where a customer makes a one-off purchase without having an agreement with the service provider. In this case the agreement has to be included as part of providing the service.

3.2.2 Service Delivery Perspective

With an agreement in place, the customer may start using services offered by the service provider. Provisioning of the service will always be made through the network operator role, as illustrated in Figure 3.2.

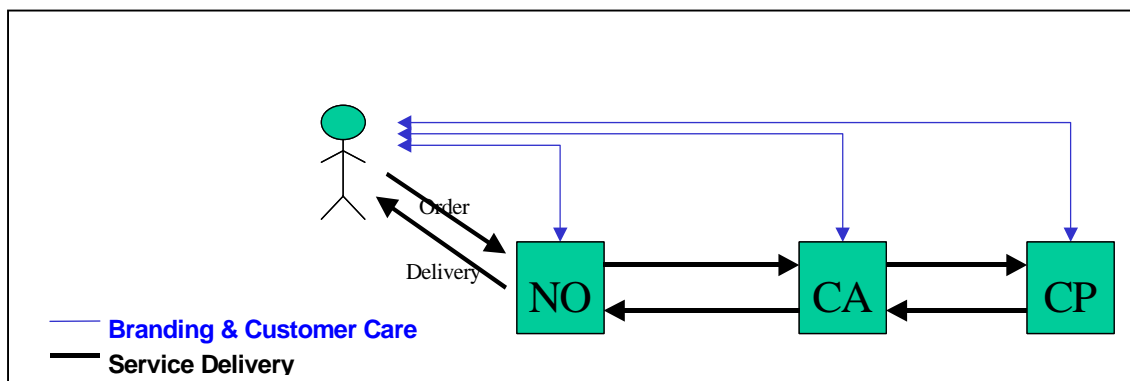


Figure 3.2: Service Delivery Perspective

The network operator, content aggregator and content provider roles could be played by one common organisation or by separate organisations. Some basic services may be provided without involving a content aggregator or content provider. From a logical perspective, however, even downloading a ring tone will involve all three parties. For example the content provider will obtain rights to a number of songs that may be downloaded, the content aggregator may price and package the songs into ring tones and the network operator will handle order and delivery flows down to the customer handset.

3.2.3 Authentication and Authorisation Perspective

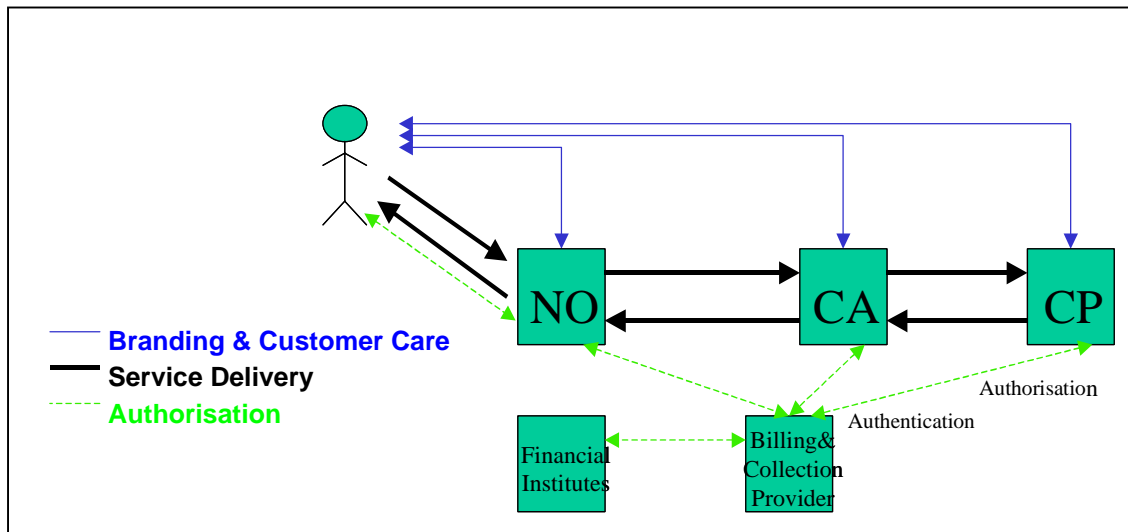


Figure 3.3: Authentication and Authorisation Perspective

In most cases, usually before a service is delivered, there is a need to perform authentication (to prove that the customer is the rightful customer) and authorisation (to verify that the customer is allowed to use the particular service), see Figure 3.3. Credit checks need to be made: in the case of a prepaid account that there is sufficient money on the balance and in the case of a postpaid account that the credit limit is not exhausted.

The whole idea with authentication and authorisation is to limit credit risk exposure for the involved parties. The scope of this process will vary considerably depending on the business conditions for each type of service. For inexpensive services and where the customer uses a postpaid account there need be no additional authentication apart from the PIN code used to unlock the USIM. For more complex and expensive services that also involve several parties the need for authentication and authorisation processes will be more extensive. For prepaid as for postpaid services this process will have to be made in real time as part of session initiation. This function is particularly crucial for prepaid arrangements that require verification that funds are available. Some services may be selected for payment by credit card, which means that verification should be made with the financial institution in question. For one-off purchases the customer will have to authenticate himself at the service-providing party.

3.2.4 Invoicing and Payment / Settlement Perspective

With all the above in place, the customer needs to pay for the services. Where multiple parties are involved there is also the need for handling settlements between the parties (Figure 3.4).

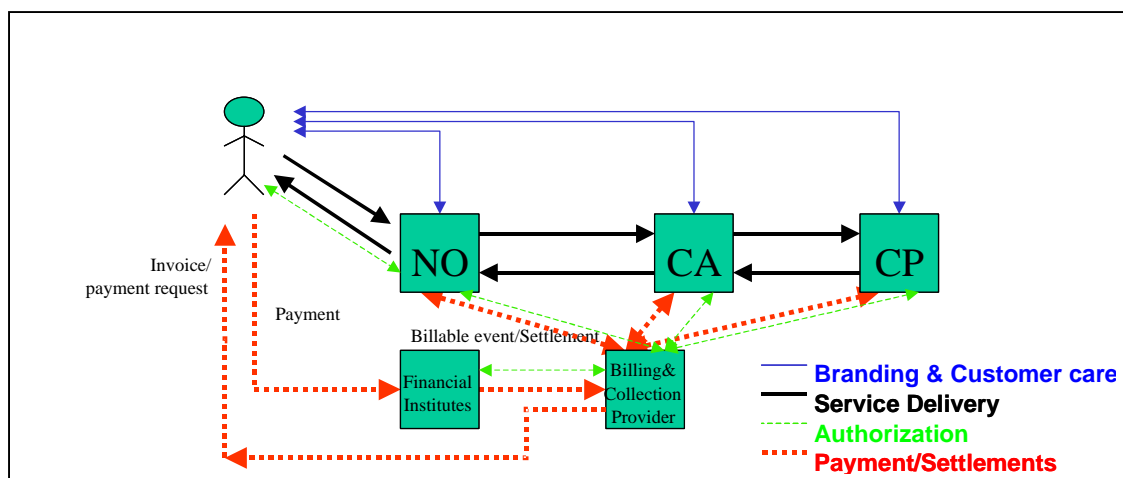


Figure 3.4: Invoicing and Payment / Settlement Perspective

Invoicing and payment for services will also vary considerably in complexity. Payments as such will reflect how the “invoicing” is made. For prepaid services invoices are not relevant but statements will have to be presented to customers in various ways, for example printed or distributed electronically once per month (or upon request). In most cases the price of a service will be immediately deducted from a customer account, be it prepaid or postpaid. Settlements between parties involved in providing a service may also be made in many different ways. For certain, any organisation would like to have more regular and possibly online access to its outstanding receivables.

One conclusion is that we regard the BCP as a single role within the business environment, handling the account balance for end customers regardless of whether the account happens to be prepaid or postpaid.

4. THREE PROBABLE 3G BUSINESS MODELS

3G services will foster a multitude of different business models. The UMTS Forum believes that the following three business models represent probable service provider scenarios, of which each will exist in parallel with many flavours and extensions:

- Network Operator centric business model;
- Content Aggregator centric business model (sometimes referred to as the m-portal model);
- Content Provider centric business model.

Figure 4.1 illustrates that the probable roles played by an organisation are defined by the business model.²

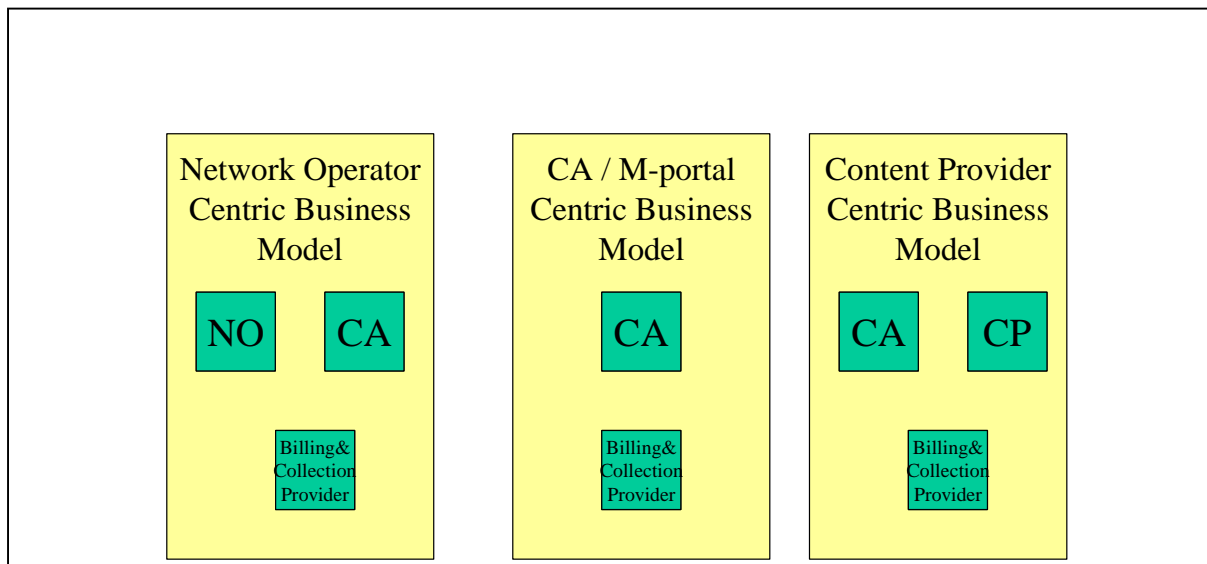


Figure 4.1: Roles played per Business Model

4.1 SERVICE PROVIDER BUSINESS MODELS

We consider a “Service Provider” to be an organisation rather than a role. A service provider has a key relationship with the customer that will normally include acting as the point of enquiry for service requests and problems. Since we believe that service providers will be highly varied in nature and will include different roles it is not necessary to provide a detailed or tight definition.

A service provider could incorporate any of the network operator, content aggregator (m-portal) or content provider roles. In our examples the billing and collections provider role is always included in the service provider entity. A minor variation to the models presented would be where the billing and collections role is outsourced to a third party provider. This variation is not discussed here.

² We have intentionally not mentioned any real life examples in these models.

The three business models discussed in this report are not expected to be the only models that develop in the market, however they are representative of three types of business that have a quite different focus and background:

Network Operator Centric Service Provider: This organisation has probably been a network operator for many years, providing fixed or mobile access to a telecommunication network. As a result they have their own billing, collections and customer care infrastructure. They are increasing their capability and added value by offering a mobile portal to their customers. In the model we consider here they do not, however, provide the content.

Content Aggregator / m-portal Centric Service Provider: An organisation which probably has a strong existing brand and builds a mobile portal and billing/collections infrastructure in order to provide a sound product. It is probable that this organisation is either new to the area of telecommunications or has moved from the Internet access service provision market. In the model discussed below the content aggregator does not provide content, however this is an obvious extension to the content aggregator business.

Another business model that has been positioned on the market is the MVNO (Mobile Virtual Network Operator) model. To some extent this model is similar to the content aggregator centric model and we regard it as a variant of this.

Content Provider Centric Service Provider: This service provider probably started as a content distributor or developer. In order to drive the business up the value chain they have developed a mobile portal and billing/collections infrastructure. The business may have a recognised existing brand or may be a niche provider. The focus is still on content but in order to create customer loyalty the business has extended its service and deals directly with the consumer.

4.2 BUSINESS MODEL CHARACTERISTICS

This section presents an overall description of each business model scenario, including a table indicating the key service characteristics. Note that these characteristics are simply examples to illustrate typical services. As we map these business models to the role relationship diagrams we can see more clearly where there is need for external interfaces between legal entities and organisations.

4.2.1 Network Operator Centric Business Model

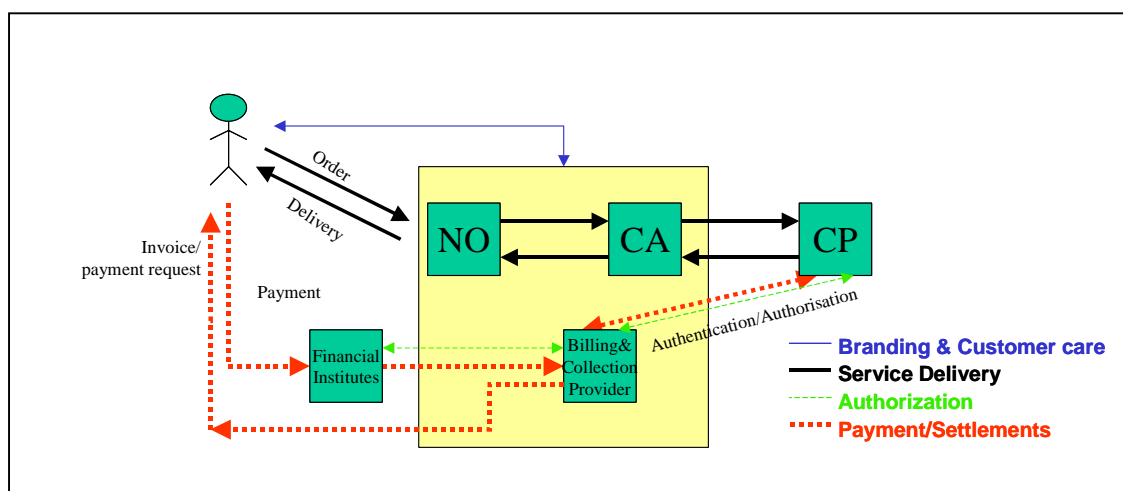


Figure 4.2: Network Operator Centric Business Model

In the network operator centric business model (Figure 4.2) the customer has a direct relationship with the network operator. The network operator sets the prices of the services and handles the payments. The content is normally acquired wholesale from content providers or is home-made by the network operator itself. The network operator therefore manages its own content aggregator role. Services are in many cases offered as bundled packages as part of subscriptions. Besides “traditional” event charges, new charging techniques may develop that handle the same basic process but in real time. Network operators will use this model to increase ARPU and to retain their customers. External parties involved may be content providers and financial institutions.

Key service characteristics for the network operator centric business model are listed in Table 4.1.

Key characteristics	Network operator centric business model
Typical services offered:	Multimedia Messaging, Location-based services, Rich / Simple Voice services.
Services offered as (part of):	Subscription, for example a subscription package will point at a "price list" for various content, while some basic services are included in the subscription rental fee.
Price of services defined by:	Network operator.
Billing / payment arranged by:	Network operator (i.e. BCP hosted by NO). Settlements on a wholesale level with content providers will apply.
Network operator revenues gained as:	Airtime, Data Volume, Message, Subscription, Advertising and Transaction / Event (mix of these depending on type of service and business setup).

Table 4.1: Key Service Characteristics for the Network Operator Centric Business Model

4.2.2 Content Aggregator Centric Business Model

The content aggregator ("m-portal") model is not limited to providing physical access to services through a mobile portal, but rather includes a range of value added services. Added value that might be offered on top of access and transport services could include authentication, security, simplicity and payment aggregation.

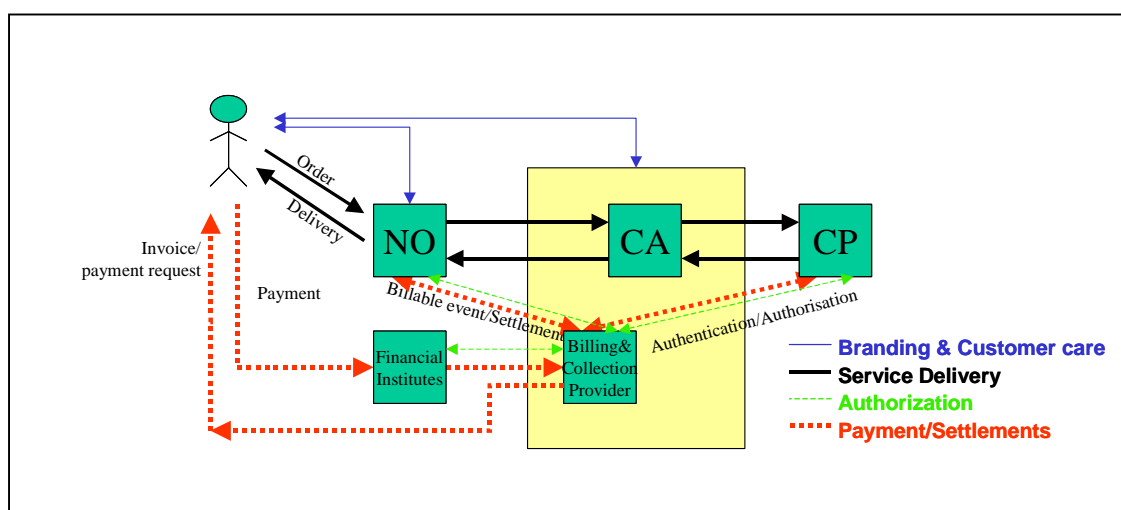


Figure 4.3: Content Aggregator Centric Business Model

In the content aggregator centric business model (Figure 4.3) the customer has an agreement with the content aggregator, but may still also have a relationship with the network operator. The content aggregator determines the price of its "content", while the customer may pay access charges to the network operator separately – this can be arranged in different ways depending on agreements made between the parties. In Figure 4.3 we have indicated the possibility that the content aggregator settles access and transport charges with the network operator.

Each transaction in this model may constitute a distinct purchase. For low value transactions, micro-payment techniques may be utilised to aggregate smaller amounts.

Key service characteristics for the content aggregator centric business model are

listed in Table 4.2.

Key characteristics	Content aggregator centric business model
Typical services offered:	Customised Infotainment.
Services offered as (part of):	Subscription and ad-hoc / one-off.
Price of services defined by:	Content aggregator, who in turn collaborates with one or several content providers.
Billing / payment arranged by:	Content aggregator, i.e. BCP role hosted by CA. Settlements between CA and CPs are handled separately.
Content aggregator revenues gained as:	Subscription, Advertising and Transaction / Event (mix of these depending on type of service and business setup).
Network operator revenues gained as:	Airtime, Data Volume, Subscription.

Table 4.2: Key Service Characteristics for the Content Aggregator Centric Business Model

4.2.3 Content Provider Centric Business Model

At first glance, the content provider centric business model is similar to the content aggregator centric model. The difference here is that the content provider has a considerable portfolio and wants to align itself with a network operator and so take up the content aggregator role. In the previous case the content aggregator will most probably sign up agreements with a number of content providers. The customer may have a relationship with many content providers in this model. The network operator will only gain access and airtime charges.

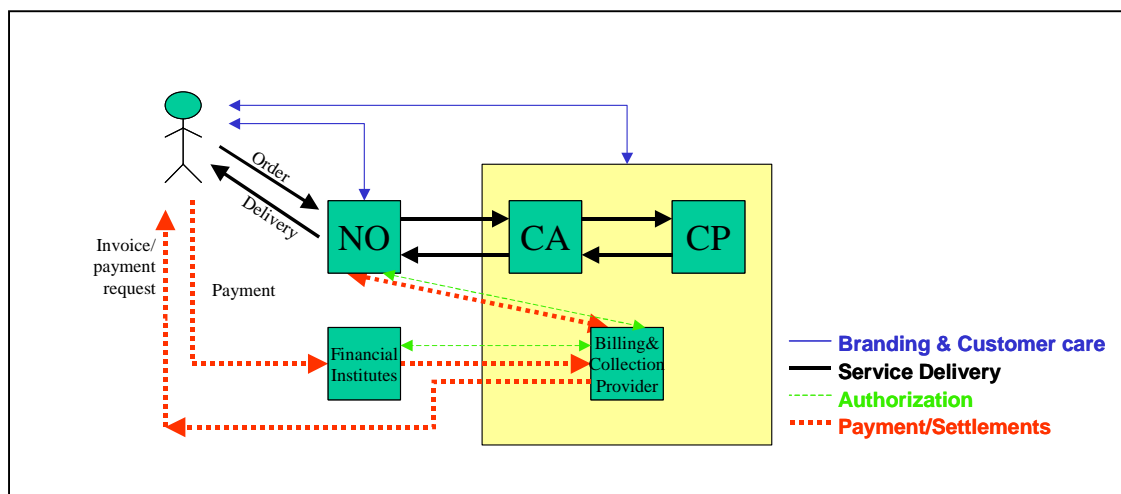


Figure 4.4: Content Provider Centric Business Model

Content providers may settle access and transport charges with the network operator to offer a complete price for delivering a service. The main disadvantage of this model is that content providers have to arrange billing and payment on their own. Also, the customer has to deal with each content provider individually – for example by paying with a credit card. In this model, the likelihood of one-time buyer-seller transactions is higher compared with the other models. The diversity of service offerings is likely to be very high, while the number of transactions per buyer-seller combination is probably rather low. For example buying a cinema ticket using this model would happen less

often than downloading MMS icons.

Key service characteristics for the content provider centric business model are listed in Table 4.3.

Key characteristics	Content provider centric business model
Typical services offered:	Mobile Internet Access, Mobile Intranet / Extranet Access.
Services offered as (part of):	Transaction, value-based services that are outside NO control.
Price of services defined by:	Content provider sets the price of transaction value.
Billing / payment arranged by:	Bank / financial institution / credit card, alternatively by having a customer account with the specific content provider.
Content provider revenues gained as:	Value-based transaction charges.
Network operator revenues gained as:	Airtime, Data Volume and Subscription charges.

Table 4.3: Key Service Characteristics for the Content Provider Centric Business Model

4.3 OTHER BUSINESS MODEL ROLES

4.3.1 Resellers

Resellers have an agent function, acting as a “middleman” between network operator organisations and end customers. They take care of selling services on behalf of the network operator, often as part of a retail shop chain. Resellers are called service providers in some markets.

4.3.2 Advertisers

A simple and easily understood view of advertisers is to compare them with content providers, the only difference being that the advertiser pays for providing the “services”. This is particularly appropriate for sponsored services. One special case is that an advertiser may sponsor a value-added service so that it becomes free of charge for the end customer. In this scenario the advertiser could pay the network operator for delivering the service.

An important consideration is the end customers’ ability to control the reception of advertisements.

4.3.3 Content Owners

In our models we have not assumed that content providers always own the original content, but they may act as agents for one or many content owners. The relation between content providers and content owners is not addressed in this report.

5. PRICING OF 3G SERVICES

The pricing of 3G services will entail more demands and more dimensions than current 2G GSM services, which are distance and duration based. As 3G is always connected there is an opportunity for pricing based on other parameters than the connection time. Still, voice services will probably be charged the same way as in 2G. Charging parameters in 3G may include many other parameters (see Appendix A). Pricing of 3G services is potentially be very complex.

When a volume parameter is part of the tariffing rule we speak of *volume-based charging*. Most operators today measure the usage of data services by means of the transported volume. *Usage-based charging* includes both time-based and volume-based charging. Finally if a tariffing method is applied based on a value parameter we speak of *value-based charging*. Since this applies mainly to content services the expression *content-based charging* is also used. An example is charging for download of MP3 music files based on the value of the 'music title'. Another common case is requesting information by sending an SMS to a content provider. The value of the receiving SMS will be accounted for. The use of these terms is blurring at the moment and the terms value-based or content-based billing are frequently used for any type of billing where usage is involved.

In any one transaction there could indeed be multiple service providers as there could be multiple bills. For example there might be cases where a customer pays the network operator for transmission separately from the application usage. Charging for services based on the applications used by the end customer is called *application-based charging*. The potential spectrum of applications is very large and the following are just some examples:

- Number of emails or files sent and/or received
- Number of web pages looked up
- Per game session
- Per movie trailer viewed
- Per ticket ordered.

From the end-customer perspective, pricing of these services would be more easily understood if business models were defined such that the application charges also cover the transmission costs (subsequently subject to settlement between the service provider parties). The challenge to each party in the value chain must be to differentiate tariffing methods to take into account the variety of services, the competitive position in the market, and last but not least make them understandable to end users.

For usage-based charging it could be tempting for service providers to introduce a flat rate model with tiers for 3G services, similar to what has been done for GPRS. That would mean that end users are billed for bundles of megabytes. Based on the experience with GPRS services so far we do not recommend a flat rate pricing model even if tiers are used. It is still difficult for end users to fully understand what they are paying for. All in all, price levels and models will be part of the competitive landscape and will vary over time until the market dictates a preferred solution.

For 3G services value-based charging may evolve from the simplistic approach of

charging end users flat fees for online subscriptions to more differentiated pricing schemes. An example is given by NTT DoCoMo, which initially charged monthly fees for their popular i-mode and 3G FOMA services but are now upgrading their billing services. The direction of this evolution is towards content providers having more control over the pricing of their services.

In the near future pricing by quality of service parameters can be expected. This will offer several packages such as bronze, silver or gold. Service level agreements could also be the basis for generating discounts when a guaranteed quality of service is not maintained.

The introduction of packages of usage-based bundles together with value-based bundles will certainly be seen.

6. PAYING FOR 3G SERVICES

6.1 PREPAID AND POSTPAID CONVERGENCE

Postpaid has been the traditional method of charging for telecommunications services for a century or more. Postpaid mechanisms have become more and more advanced but the problem of collecting money retroactively from customers always remains. A major advantage with postpaid is the ability to handle the long-term customer perspective in terms of discounts, corporate agreements, etc.

Prepaid has recently emerged as a convenient alternative providing cost control for substantial customer segments and less risk exposure for service providers.

The industry tends to agree that the current situation will change and that prepaid and postpaid will merge, pending availability of solutions and migration paths. Prepaid or postpaid will – to put it simply – only be a matter of where to put the credit limit, that is whether or not to allow a negative balance on the customer account.

In certain geographic areas the number of prepaid users is still increasing but in other geographic areas the popularity of prepaid is decreasing and an increase in postpaid subscriptions can be expected.

Customers should be able to have the same basic services and incur prepaid or postpaid usage charges according to their preferences. The final “look and feel” of the selected offering will then depend only on the service packaging from the service provider. The mechanism for delivering services before or after a user’s balance is verified will depend on the status of the end user.

It should be possible for a customer to change status seamlessly from prepaid to postpaid and *vice versa* without changing phone numbers or type of service. The service provider does of course have the option of packaging the prepaid service differently from the postpaid service.

A customer should be able to use both prepaid and postpaid services and still be handled as a single customer. It should therefore be possible to define packages including both prepaid and postpaid services. Selecting the payment method on a per transaction basis will eventually be an option for the customer.

6.2 THE NEED FOR REAL TIME

Given that the separation between prepaid and postpaid services will disappear then service transactions will have to be managed in real time or near real time, in order to control expenditure and eliminate credit risk. For service transactions to be handled in real time, the account balance will have to interact closely with the product catalogue managed by the service-providing entity. For customer specific pricing to be allowed, the customer profile must also be known when assigning the price to be used.

Update of the account balance for service usage using current technology could be achieved by accessing a service control point or equivalent in the network operator’s network.

The customer will want to have access to up-to-date account status information. So will management at the service provider and its business partners. Information exchange will therefore increasingly use real time online capabilities.

6.3 PAYMENT PROCESSING

As indicated above a customer may have one or multiple accounts with one or many parties. A customer's payment for a service will be addressed to the party responsible for offering the service and with whom the customer has an agreement. With many parties involved the opportunity for "billing on behalf of" arrangements are evident. Simplicity for the customer will drive development – many customers would like to keep a single invoice approach to their telecommunications spending.

Financial institutions will also play a role, initially taking care of billing for services that other service providers will not be able to manage by themselves.

6.4 PAYMENT METHODS

As stated earlier in this report the distinction between prepaid and postpaid will disappear or at least change over time and end users will have a number of ways to pay for their 3G services. There will be an account balance that can be managed in different ways.

Referring to the payment technologies in place today, here are three possible basic methods:

- **Postpaid;** after presenting the bill to the end user the account may be credited by using direct debit, credit card, cheque or cash. This depends on the service provider and on the payment culture in a country. Advice of charge is needed to prevent the spending limit being exceeded.
- **Prepaid;** here services are only delivered when the end user has already paid for usage in advance. It is used by end users such as teenagers to provide a means of budget control and by end users wishing to use services anonymously. It is expected that prepaid payments will be a major method of paying for 3G services, in particular for content services. With 3G the mechanism of topping up the prepaid balance using the 3G device itself will be further exploited. Advice of charge is required to warn the customer that if he wants to use that particular service then his credit will be exhausted and the service will probably be disconnected.
- There is also room for different "pay now" processes, for example using a so-called **e-Wallet**. This can be used in cases where a customer makes a one-off purchase without having an agreement with the service provider. One alternative method for "pay now" would be to supply a credit card number (using a secure technology). Loyalty bonus points with the service provider could also be used for small 3G purchases such as cartoons and downloaded ring tones. A common factor with all these methods is that the agreement and payment is decided upon as part of providing the individual service.

7. SETTLEMENT ISSUES

7.1 SETTLEMENT

The subject of settlement is too large for a detailed review within this report. It would necessarily include, for example, an extended discussion of the many business models that support the joint delivery of services.³ The following section briefly outlines some of the common issues involving the creation and support of partner settlement.

Note that in the context of this report "Settlement" refers to the accounting of monies between two or more partners who jointly hold responsibility for delivering a service to the end user. This does not include the subject of physically handling the transmission of monies between organisations, people and banks, which is often referred to as "settlement". The use of "settlement" in this report is similar to the use of the word in the context of "interconnect settlement".

There are many services that cannot be delivered wholly by a single provider. Alliances and partnerships are formed in order to deliver a wider set of services than a single organisation could achieve. Organisations work together in many different ways to deliver a complete solution encompassing the provision of electronic content, physical goods, network access and transmission, and physical goods distribution. These alliances provide a much more convenient service to the end user than a multitude of separate organisations could. Benefits include enabling the end user to receive fewer bills and to manage fewer relationships in order to get the desired products and services.

If network operators do not embrace new partners then they may become only transmission pipes, the end user opting for content outside the control of the operator. If content providers do not embrace new partners, then they will fight for publicity and market share with a vast array of similar providers and struggle to gain momentum and market acceptance. Alliances that provide value and convenience to customers will be successful. However, these "next generation" partners produce a new set of complexities and challenges for the process of settlement. The following sections discuss some of these increased complexities and issues.

7.2 PARTNERSHIP COMPLEXITIES

Partners will expect to launch new products and services without any impediment caused by the settlement systems and processes. Due to the potential number of partners, the introduction of new services must therefore be both rapid and efficient. Systems managing pricing for settlement costs must be easy to use and preferably transparent to all parties.

³ The UMTS Forum ICT Group is currently preparing a report on settlement.

7.2.1 Partner Contracts and Business Models Change Frequently

New partners will constantly be brought into an alliance programme and many of these will require new business models. It may be possible to manage many small partner organisations with a common process and business model but larger and more influential partners will expect their model to be supported and/or concessions to be made.

7.2.2 Partner Settlement Rates Change Frequently

Partner product tariffs (both wholesale and retail) will change regularly and require constant negotiation and modification of data within the settlement systems. Rapid changes to the wholesale tariffs and ease of testing and reporting of these rates are imperative. Without this settlement statements will be frequently incorrect and the settlement of revenues will become costly to operate.

New content and network “exchanges” will also speed up the rate of price change. Tariffs may become negotiated through semi-automated processes and this will require automated changes to the settlement tariffs.

7.2.3 Frequent Re-rating of Events

Because of the volume and rate of changes to wholesale tariffs mistakes will inevitably occur. The system processes must enable rated events to be re-rated with new, corrected tariffs. This must be a highly automated process otherwise operators will constantly be in catch-up mode. In some cases, previously settled amounts will need to be undone without the need for complex manual processes to bring databases back to the state they were in when the error was noticed. Today in the interconnect settlement world, this common situation can be costly to operate.

7.2.4 Partners may Capture Data in a Different Way

Settlement processes will not be highly standardised initially; larger partner organisations will have their own settlement processes and may provide settlement data in a significantly different form. The operator must be able to capture partner data in many different formats with, for example, different attributes. These differences may create a complex reconciliation process and hence require some level of automated reconciliation.

7.2.5 Each Retail Event may Result in Multiple Party Settlements

Since each retail event that is billed, or reported, may require many settlements, the volume of settlement events will be much larger than in the standard retail environment. For many companies the additional costs associated with settlement may well be greater than their existing retail billing costs. The cost of processing each settlement event must therefore be minimal.

7.2.6 Multiple Partners may Collect Revenue from the Customer

In some complex partner relationships it is possible that end customers are billed by

more than one partner in the alliance. Consider the example of a music file content provider and content aggregator. The content aggregator may re-sell and even re-brand some of the content provider's goods but for certain titles may rely on the customer buying direct from the content provider. In this example the settlement between the partners will be in both directions. For some events, payment will be from one partner to the other and for other events payment will be reversed. In some countries, it will be necessary to maintain separate settlement balances but in others, the settlement will need to be "netted off". In addition, if one partner is doing the retail billing on behalf of the other then the end-customer may be managed as multiple "logical" customers within the same system.

8. SERVICE ACCESS WHILE ROAMING

Users will expect to access all services while roaming as well as at home, including services both in the home network and in the roaming network. This imposes completely new demands on service access and roaming capability, particularly where expensive services or transactions are involved and when prepaid is the payment method. Roaming can take place in visited countries as well as potentially on other networks in the home country. Mechanisms to prevent fraud in roaming networks must also be put in place, especially as more valuable services and content increase the risk exposure for service providers in both visited and home networks. Security for end users and system transparency is also important to generate the trust required when buying expensive content. Prepaid as well as postpaid payment models must be supported.

The following sections discuss three roaming scenarios using the roles previously defined for the business models. A separate entity for Authentication, Authorisation and Credit reservation (AAC) has been added. The AAC function may be performed by a separate organisation or be hosted within the other roles.

Real-time AAC is very important for eliminating payment risk as it allows online checks of both prepaid and postpaid accounts. The two payment methods are very similar, the only difference being the credit limit on the accounts.

8.1 ACCESS TO HOME CONTENT WHILE ROAMING

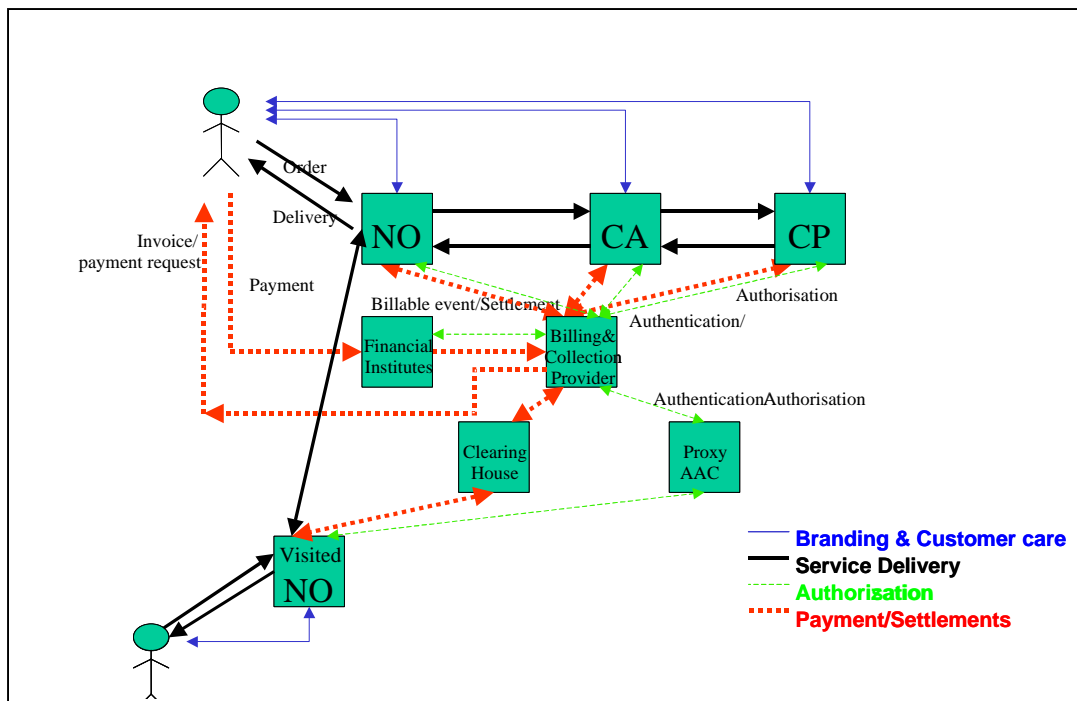


Figure 8.1: Access to Home Content while Roaming.

This case is illustrated in Figure 8.1 and is similar to today's GSM postpaid roaming where the HLR is used for authentication and authorisation and the financial part is done through clearing houses based on TAP3 files. The need for authorisation in

prepaid roaming goes beyond the HLR and a new AAC proxy needs to be standardised.

A customer may want to access content in the home network while travelling and does not expect this to be more complex when roaming. When accessing home services the gateway out of the 3G networks will most likely be in the home network as in 2.5G networks today. So the only extra element will be the transmission from the roaming network back to the home network.

The customer pays for used services through the “home account” – regardless of prepaid or postpaid considerations. A clearing house will be involved in settling the roaming charges between the visited network operator and the home network parties. TAP3 files can be used to exchange information, with prepaid this is only for generating or verifying inter-operator accounting.

8.2 LOCAL CONTENT BILLED BY HOME BCP

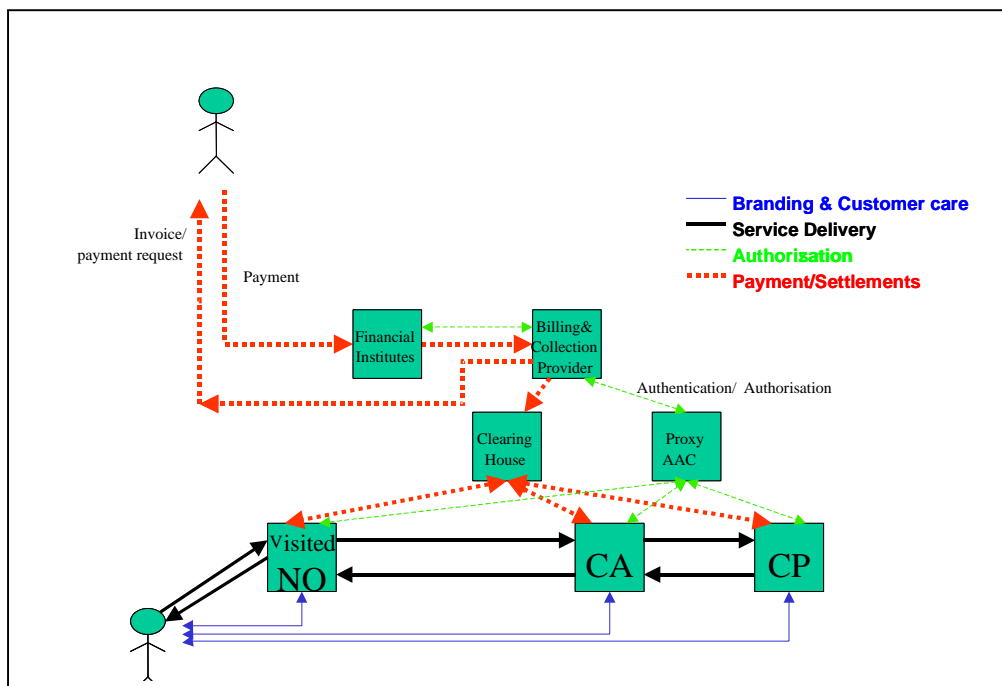


Figure 8.2: Local Content Billed by Home BCP.

In this case (Figure 8.2) the roaming customer uses content (services) offered by the visited network – also called local content – which is billed by the “home BCP”.

Accessing local content in a foreign network either with direct access, as in Figure 8.2, or indirectly from another network, puts new demands on the home billing and collections provider for authentication and authorisation. The sending of billable events and settlements goes beyond the conventional TAP3 process.

Depending on the local (visited) market conditions, local players may offer a selection of their services to visiting customers. The customer will then have a similar interaction with the local players as when using services in his home environment with local content billed by the home BCP.

Access to local content in the roaming network or other networks is of interest as there are no clear parallels in today's network. Access to local premium rate services in the roaming network, for example, is in general not possible with GSM today due to limitations in roaming agreements or charging technology.

The most important enabler for services abroad (and at home) is trust, or more specifically authentication and authorisation so the provider partner can be sure to get paid for providing the service – both transmission costs as well as payment for received goods or information. This becomes increasingly important as the value of services increase.

Existing infrastructure does not allow real-time authorisation so new elements are required. Inspiration can be taken from the work on Beyond 3G where Diameter (improved Radius) is central in authentication and authorisation. In 3G Networks Radius-based authentication/authorisation requests are sent back to the home network via a hierarchy of AAA proxies so all networks do not need to know about and have agreements with all others. Figure 8.2 shows the case of a foreign network contacting the home Billing and Collections Provider through a Proxy AAC role. The billable events, and the subsequent settlements, go through a clearing house role. These two roles could be handled by a single company, as could all the other roles.

The lack of standard protocols implies that different solutions will be offered by different vendors of billing systems and content systems.

Improved authentication and authorisation as described here will also remove one of the barriers that restrict today's 2.5G users to the home GGSN only. This limitation arises because operators cannot control access and usage unless traffic is routed through the controlled home GGSN.

8.3 LOCAL CONTENT BILLED BY LOCAL PARTY

We might also see cases where a local party bills the local content (services) to the end user (Figure 8.3). The payment could be made using a credit card, for example, either during the purchase transaction or in advance through a prepaid procedure.

This will most likely be the most common method of payment during an initial transition period as it provides security for the content provider without the need for new common protocols and procedures. The end-users will see this kind of payment both as a way to be unknown but also see it as rather irritating and limiting for the business.

The interaction for the customer will be rather similar to their experience in the home environment. A particular consideration for the parties involved is that the customer will not be known beforehand.

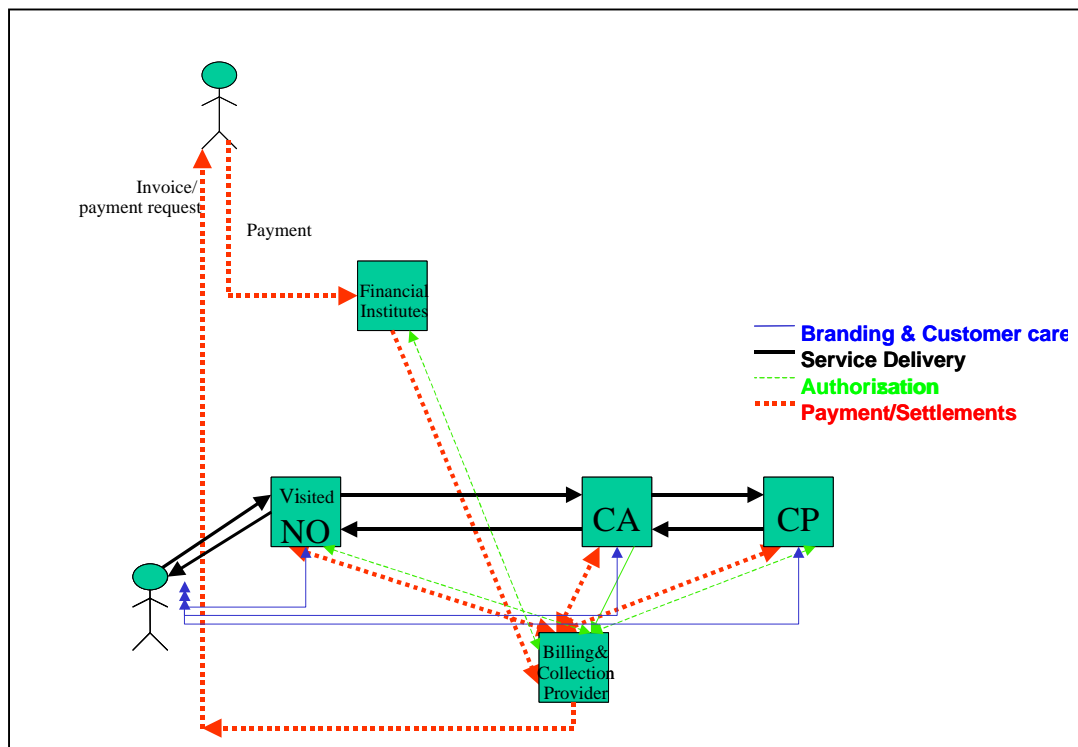


Figure 8.3: Local Content Billed by Local Party.

8.4 OTHER ROAMING CONSIDERATIONS

User-to-user communication between two UMTS devices when roaming is not covered in the roaming cases considered above which are primarily concerned with access to content. For user-to-user communication when roaming the bit pipe needs to be made local. The price must reflect the data path and so be cheaper than the bit pipe to the home network and back. In principle GSM solved this problem by optimal routing, although this has not been implemented by operators.

9. CONCLUSIONS: CRITICAL SUCCESS FACTORS FOR BILLING

This report starts from the principle that applications and services will be the main competitive differentiators and sources of increased revenue for operators and service providers. Typically, organisations will incorporate one or more business roles, such as Network Operator, Content Aggregator and Content Provider. Three business models, which use these roles in different ways, have been identified and discussed within the report.

There is general agreement within the industry that with a diversification in services offered, it will be a requirement on service providers to support multiple and diverse payment methods. The currently dominating split into pre-paid and post-paid services is likely to merge, while the end-user will want to pay for services in the way it for the time being suits him or her.

Given that the separation between prepaid and postpaid services will disappear then service transactions will have to be managed in real time or near real time, in order to control expenditure and eliminate credit risk. This not least for roaming scenarios, but also for valuable m-commerce services. Billing and collections will ultimately become a single role within the business environment, handling the account balance for end customers regardless of whether the account happens to be prepaid or postpaid.

Network operators and content providers need to embrace new partners within alliances that provide value and convenience to customers. However, these "next generation" partners produce a new set of complexities and challenges for the settlement process. These issues need to be addressed.

Users will expect to access all services while roaming as well as at home, including services both in the home network and in the roaming network. This imposes completely new demands on service access and roaming capability. Mechanisms to prevent fraud in roaming networks must be put in place, especially as more valuable services and content increase the risk exposure for service providers. Security for end users and system transparency is important to generate the trust required when buying expensive content.

Analysis of revenue streams within the different business scenarios has determined areas where standards and open interfaces are required to overcome vendor-specific solutions, to prevent interoperability problems and to open up fair competition between vendors.

Whilst there are few reasons for ever trying to standardise 3G business models, this report highlights the interfaces between the major entities that should be the subject for standardization. Standardising these interfaces will create an open business environment which will enable organisations to be created quickly and to build integrations with numerous business partners rapidly and cost-effectively. This will result in cost and service benefits to the whole industry, including the end-user's.

Specific areas that are candidates for standardisation include:

- Interfaces between content providers and service providers, for example to exchange relevant charging information.
- The usage of a charging protocol or similar for the availability and exchange of real time (rather than batch oriented) charging and authorisation information. This is a minimum requirement for roaming scenarios. Charging information has to be available from the network elements or from the application servers through to the billing system. Any possibility is to define the interface standards and develop industry buy-in (or vice versa - i.e. get buy-in and then develop standards to meet the agreements).

Other critical success factors include:

- Identify the interfaces noted in the report that are critical to supporting an effective open business model and which have a lower importance.
- Players have to find their position in the value chain, for example service providers and content providers have to agree on their respective roles for each of the business models.
- Trust, from both provider and end user, is key to success or failure. If trust is missing the result will be lack of content and in all cases a lack of use, so the design of the authorisation and payment infrastructure are critical.
- Quality of service – what will the customer accept? Quality of service must meet customers' expectations or services will fail to be taken up. Note that QoS measurements will not initially be available in 3G networks.

As for the retail Charging, Billing and Payments aspects that have been analysed in this report, Settlements will also undergo a range of changes. It has been decided to produce a dedicated UMTS Forum report to highlight the Settlements related issues.

10. APPENDIX A: CHARGING ATTRIBUTES

Sample parameters that can be used to determine the price for a service are summarised in this section. Some examples are provided. The pricing of a service may be based on one or several of the attributes listed below:

- Service: The value of the service delivered. Examples: content type and content ID, gaming units (e.g. lives, bullets, points scored, high scorer);
- Price (e.g. pre-rated by content provider);
- Subscription: e.g. a bundled offer including access, fixed charges and a certain usage;
- Duration: the time spent using a service;
- Destination: from where or where to;
- Location: e.g. inside a VPN or at a specific place;
- A person's role ("persona"), for example at home or at work;
- Volume: e.g. downloaded volume in megabytes;
- Network: your own network or visiting another network;
- Device capabilities: viewing a picture or video with a low-resolution terminal may invoke a lower price;
- Quality of Service (QoS): offered or guaranteed service quality;
- Service Termination Indicator: charges may depend on why, when or where a service was abnormally terminated;
- Event: there may be fixed prices for certain events, similar to today's pricing for sending SMSs;
- Transaction type: receiving a certain type of message may have a specific price;
- Transaction value: e.g. a service provider may always get 10% of the full transaction value, while the full transaction value is determined by the content provider;
- Content provider, content aggregator or network operator identity.

On top of the charging attributes bundling, discounting and loyalty bonus schemes may impact the actual price a customer pays for a service.

11. APPENDIX B: DEFINITIONS USED IN THIS REPORT

Term used	Explanation
Application-based charging	Rating based on application-based parameters, for example number of messages.
Authentication, Authorisation and Credit reservation (AAC)	As part of service initiation and execution there will be a need to identify and authorise customers using a service. Sometimes a credit reservation is part of this process.
Billing	The billing process selects all the usages for a particular period and puts them on the bill together with subscription fees and discounts.
Billing & Collections Provider (BCP)	The BCP issues bills (or equivalent) and arranges for collection of payments from customers. BCPs handle both prepaid and postpaid billing arrangements. In most cases the BCP will also handle Authentication, Authorisation and Credit reservation (AAC), in particular for prepaid arrangements where the AAC function happens in real time. (In roaming scenarios another party may be involved in AAC management.)
Charging	Rating of usage.
Content Aggregator (CA)	The key function of the CA is to package and offer services from one or several Content Providers.
Content-based charging	Rating of used/delivered content.
Clearing House (CH)	Clearing Houses communicate the roaming records and/or settlements between visited and home domain "parties".
Content Provider (CP)	The role of the CP is to provide services ("content" or applications) that add value to access and transport services. Value-added services can be produced by the CP itself or purchased from others.
Financial Institution (FI)	Financial Institutions handle payments and financial transactions in general on behalf of other organisations. A bank or a credit card company could provide the FI function.
Network Operator (NO)	The key function of the NO is to provide access and transport services. A network operator is typically a 3G licence holder.
Reseller	Resellers are called Service Providers in some markets and act as an agent between the network operator and end customers.
Service Provider	Service Providers are organisations that have a key relationship with the customer. This relationship will normally include acting as the point of enquiry for service requests and problems. The definition of a Service Provider varies considerably between different markets and can include different roles. It is therefore not appropriate to provide a detailed or tight definition.
Usage-based charging	Rating based on duration and/or volume.

12. APPENDIX C: ABBREVIATIONS AND GLOSSARY

Abbreviation	Meaning	Explanation
2G	Second Generation	Generic name for second generation networks, for example GSM.
2G+ or 2.5G	Second Generation enhanced	Name given to 2G networks enhanced with GPRS or EDGE.
3G	Third Generation	Generic name for third generation mobile networks.
3GPP	Third Generation Partnership Project	A co-operation between regional standards bodies to ensure global inter-working.
AAA	Authentication Authorisation Accounting	
AAC	Authentication, Authorisation and Credit reservation	See Appendix B.
ARPU	Average Revenue Per User	Used as a performance indicator among mobile service providers.
BCP	Billing & Collections Provider	See Appendix B.
CA	Content Aggregator	See Appendix B.
CAMEL	Customised Applications for Mobile networks Enhanced Logic	CAMEL specifies how features normally associated with intelligent networks can be integrated into a GSM network. CAMEL allows information on the caller's location to be passed from the network to an Internet web site.
CH	Clearing House	See Appendix B.
CP	Content Provider	See Appendix B.
Diameter		Second generation of AAA-protocols specified by IETF, that should be twice as good as Radius, which was the reason for the name. Special targeting roaming and Mobile-IP.
EDGE	Enhanced Data rates for Global Evolution	A further enhancement to TDMA systems that allows for data speeds to 384 kbit/s.
FI	Financial Institution	See Appendix B.
FOMA	Freedom Of Mobile Access	Trademark for NTTDoCoMo 3G Services in Japan.
GGSN	Gateway GPRS Support Node	
GPRS	General Packet Radio Service	An extension to GSM, allowing packet switched high-speed connections.
GSM	Global System for Mobile communications	The most popular standard for 2G mobile networks.
HLR	Home Location Register	
HTML	Hypertext Markup Language	
ICT Group	Information and Communication Technologies Group	A working group of the UMTS Forum.
ID	Identity	
i-mode		Proprietary HTML-based mobile information service offered by NTT DoCoMo in Japan. The i-mode service is similar to WAP.
IMSI	International Mobile Subscriber Identity	
IMT-2000	International Mobile Telecommunications 2000	ITU initiative for a global standardised 3G wireless network.
MMS	Multimedia Messaging Service	An enhancement to SMS, including e.g. pictures as well as text.

MP3	Music Player	The term has become synonymous with the MP3 player that delivers compact disc quality music.
NO	Network Operator	See Appendix B.
PIN	Personal Identification Number	
QoS	Quality of Service	The delivered service quality, often as experienced by the end customer.
Radius	Remote Authentication Dial In User Service	Protocol to authenticate dial in access, emerged to the main protocol for authentication/authorisation/accounting in the data access layer including routing and service access.
SIM	Subscriber Identity Module	
SMS	Short Message Service	A service that enables the sending and receiving of short text messages of up to 160 characters.
TAP3	Transferred Account Procedure version 3	TAP is the process that allows a visited network operator (VPLMN) to send billing records of roaming subscribers to their respective home network operator (HPLMN). TAP3 is the latest version of the standard and will enable billing for a host of new services that networks intend to offer their customers.
TDMA	Time Division Multiple Access	
UMTS	Universal Mobile Telecommunications System	UMTS is a modular system that incorporates several technologies that realise the convergence of existing and future mobile and fixed networks, including the Internet. The UMTS concept embraces all applications and services that can be offered to the end-user. UMTS is a member of the IMT-2000 family of systems.
UMTS Forum	Cross industry body	Non profit, independent forum that gives guidance to standards and other bodies in terms of market requirements and issues to be solved to allow for a smooth deployment of UMTS. www.ums-forum.org
USIM	UMTS Subscriber Identity Module	A 3G extension to the SIM cards used for GSM.
VPN	Virtual Private Network	
WAP	Wireless Application Protocol	Protocol used to allow the transmission of simple web pages in 2G networks.