Payment Solutions for Services in Interactive TV
– A Comparative Evaluation of Electronic Payment Systems

Master’s thesis written at the
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This thesis aims to investigate the market for electronic payment solutions with a focus on payment for interactive content and services in digital TV. The presumptive services are many which lead to a relative complex analysis of how they should be paid for. What kind of service is it really to be paid for? In order to conduct an appropriate analysis this thesis contains an identification of five different service/content types. The grouping we have conducted is in so called On Demand services, Voice over IP, Shopping, Interactive TV and web services.

In order to be able to conduct a relevant assessment of how the distributed services should be paid for the understanding of the market situation is utterly important. Therefore the thesis contains a pre study of the different market actors that can be related to a set top box and interactive TV.

The study of eight different actors on the Swedish market provides an overview of content providers’ as well as payment companies’ view on how interactive content and services should be paid for.

The result from the thesis is a recommendation on how an electronic payment solution should be designed and important aspects to think of. One of the key outcomes is that different services needs different types of payment solutions which implies that you should first decide on what type of services that are to be provided before a decision is made on the payment solution.

A byproduct from the thesis is the analysis model that facilitates analysis of services as well as payment solutions and – methods related to electronic payments and interactive media.

Payment solutions, interactive, television, digital-TV, set top box, electronic payment, price, model, analysis, method
Abstract

The market for digital TV is developing and some industry actors focus on interactive TV. Interactive content and services that previously only were able to use through a standard PC are now available to use through the TV set. To distribute the services to the TV a so called set top box with broadband connection needs to be used. Such a box can be described as a unit where a standard PC and a digital TV receptor are integrated.

This thesis aims to investigate the market for electronic payment solutions with a focus on payment for interactive content and services in digital TV. The presumptive services are many which lead to a relative complex analysis of how they should be paid for. What kind of service is it really to be paid for? In order to conduct an appropriate analysis this thesis contains an identification of five different service-/content types. The grouping we have conducted is in so called On Demand services, Voice over IP, Shopping, Interactive TV and web services.

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Sammanfattning


Förståelsen för marknadens sammansättning är synnerligen viktig för att kunna göra en relevant bedömning av hur betalningen för distribuerade tjänster ska gå till. Därför innefattar uppsatsen en förstudie av de olika aktörerna som kan sammankopplas med en set-top-box och interaktiv TV.

Studien av åtta aktörer verksamma på den svenska marknaden ger en överblick av såväl tjänsteleverantörers som betalningsföretags syn på hur interaktivt innehåll och tjänster bör betalas.

Resultatet av uppsatsen är en rekommendation för hur en elektronisk betalningslösning bör utformas och vad som är viktigt att tänka på. En av huvudpunkterna är att olika tjänster behöver olika typer av betalning vilket gör att man först bör titta på vilka tjänster som är tänkta att användas innan man bestämmer sig för betalningslösning.

En biprodukt av uppsatsen är ett analysverktyg som möjliggör analys av såväl tjänster som betalningslösningar och –metoder.
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This thesis is conducted as the last part of the M.Sc. program in Industrial Engineering and Management at Linköping Institute of Technology. In the process of writing we have encountered a number of obstacles, which we have been able to overcome through the aid of a number of advisors. In order to initially obtain information about the studied industry the cooperation with Johan Ohlsson and Björn Thelin at Ecton and Geir Brynj-Jensen at Accenture has been invaluable. They have also supported us throughout the work with the thesis.

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Stockholm, January 2004

Fredrik Aminoff                Johan Dettel
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1 Introduction

In this chapter we provide the reader with a brief background to the topic and the purpose and delimitations. There is also a reading instruction with an explanation of how the report is structured.

1.1 BACKGROUND

The interactive media industry is penetrating our homes more and more and now the turn has come to the TV. In the next few years ordering and watching a movie directly from the TV remote control will be as natural as using a mobile phone to place a phone call. The payment for the different services and goods offered will be made automatically without the user having to go through complicated registration procedures.

During the past few years many companies have developed and launched new digital TV boxes with a broadband connection so that consumers can interact with their standard TV set. This thesis is written for Ecton AB, a company that is developing one of these next generation boxes. The founder of Ecton has a profound experience within the IT and media industry and has for example been behind the development and marketing of the digital TV box Boxer. Ecton is now building the next generation of interactive media boxes, a so called Set Top Box (STB), with a focus on the digital broadcasting services and the Internet.

The STB that Ecton is developing will be similar to a standard PC available on the market today but with an additional receiver for digital television (DTV) and a broadband connection. The main idea is to make it possible for the consumer to use the TV together with services available on the Internet and hence diminishing the boundaries between TV and Internet usage. Consumers shall for example be able to download movies from an available database, usually called Video-On-Demand or Pay-Per-View, and it will also be possible to play games normally played on the computer via the Internet through the TV instead. Other services could include booking a test drive of the latest car model directly during a TV commercial or use the STB as a telephone via Voice over IP (VoIP).

The objective for Ecton is to launch a platform with such flexibility that the end consumer can use it for a wide array of different services not only related to the TV but also related to the home. The STB is designed to function as a gateway between the external information infrastructure and the internal electrical appliances in the home of the consumer. This will enable the consumer to regulate for example the heating or the garden watering system from a position external to the home.
1.2 PROBLEM DISCUSSION
The services provided over the STB have to be paid for in some way and this thesis will focus on the payment solutions that could be suitable for this type of product. A substantial number of uncertainties arise when it comes to payment for interactive services. The numbers of different content and service providers have their own opinions of how the payment solution should be designed and the payment solution must be flexible enough to meet the requirements of different types of services. From a business perspective some services are for example more suitable to be charged for by the length of use while others are more suitable to have the service or product itself or the amount of data downloaded as a base for pricing. Moreover the solution has to provide a certain level of security and in the same time be so user friendly that it does not affect the use of the service in a negative way. Common electronic payment methods today are for example credit and bank cards and physical bills but the easy-to-use status of those solutions can be discussed when it comes to payment for services through the TV.

1.3 PURPOSE
The question that we want to answer with this thesis in relation to the discussion above is:

- Which available payment solutions are suitable for payment of services in interactive digital television?

The purpose of this master thesis is therefore to (1) delineate payment solutions currently in use for electronic services and (2) suggest a conceptual design of a flexible payment solution for services in interactive digital television for Ecton’s Set Top Box services.

1.4 PURPOSE DISCUSSION
In order to fulfill the purpose and understand the problem with payment solutions we believe that it is necessary to be familiar with the different actors of the industry that surrounds a digital set top box. To understand how these components interact and how they are dependent of each other is according to us a prerequisite to the understanding of payment solutions. We will therefore discuss and explain the constituents of the digital set top box industry in the pre study section of this thesis.

1.5 DELIMITATIONS
We have chosen to make some delimitations to our thesis for mainly two reasons. One reason is time, we have limited time available, and the second reason is focus.
We want to target the thesis at a specific issue and have therefore chosen not to focus on the following issues.

**Industry development and value chain positioning**
One interesting issues that contributes to the understanding of payment for interactive services is what or who in the value chain drives the development of new payment solutions and where in this value chain should our contractor be positioned? The latter is by all means important because the suitability of the chosen payment solution is dependent on the positioning in the value chain. This goes however beyond the scope of this thesis but after discussions with our contractor we have gotten an understanding of our contractors view on the matter.

**Security**
Everything that has to do with money transfers and charging of different services requires high security and certainty that all information is correct. The purpose of this thesis is to analyze different payment solutions that all depend on accurate information to function as intended. We have therefore chosen not to take accuracy of the accounting information provided by the STB into consideration. The aim for our contractor Ecton is that their STB will live up to the defined computer security framework AAA. This thesis does not cover how to obtain the security framework AAA but it gives a brief description of its basic principles and in the analysis presumes that the STB achieves this desired standard. We do however cover the process of identifying the user in different ways, but the more detailed and technical explanation of how the identification is achieved goes beyond the scope of this thesis.

**Consumer analysis**
This thesis will not make a more extended analysis of consumer behavior and their needs. We will however reflect upon the importance of an easy to use payment solution from an end consumer perspective.

**Services in the connected home**
The STB has several very interesting applications and services that will be available in the future. Most of which can be referred to as services in “the connected home” where you will be able to control most of the electronic devices in your home from a remote control and even when you are not at home. We have however chosen not to take the many of these possible services into consideration because they are not available today.
Geographic scope

Much of the secondary data that we will use as reference in this report is collected from industry reports that covers international markets. However, due to limited resources regarding primarily funds and time the primary data that we will collect in our study will be from the Swedish market.

1.6 READING INSTRUCTIONS

This thesis has two main target audiences. The first is the academic world with interest in the subject at hand. They should read the thesis from start to finish to fully understand the academic aspects of our work. Business professionals working in this industry should at least read the four chapters; Introduction, Study, Analysis and Conclusions. Our contractor Ecton should also read the chapter Analysis models.

There are two kinds of notes used throughout the thesis; Footnotes on the same page that explains a word or abbreviations and Endnotes at the end of each chapter with reference to the literature.

In Appendix A at the end of the report all abbreviations and technical terms are summarized and explained.

1.6.1 Thesis outline

The thesis is divided into 9 chapters with an appendix at the end. The chapters are as follows:

1 Introduction

In the Introduction the reader is given a brief background to the topic and the purpose and delimitations.

2 Theoretical framework

Here the underlying established theories that constitute our theory-base for the process of forming our own theories are presented. The reader is introduced to a number of fundamental topics that apply to the topic at hand.

3 Research methodology

In this chapter we present and discuss the action science method that we have used and also how we have gathered information to our thesis.

4 Pre Study

In this chapter we provide information about how a set top box works and how the consumer receives digital TV. We also explain the different roles of the
components in the interactive digital TV industry and how they interact with each other.

5 Analysis models
Here we present the analysis models that we have developed to assist us in the analysis.

6 Study
In this chapter we present the information that we have gathered in our field study from a number of industry actors. Both actors in the iTV industry and different providers of payment solutions have been interviewed.

7 Analysis
In this chapter we present the result from using our analysis models. The analysis covers both services in interactive TV and the different payment solutions.

8 Conclusions
Here we present our conclusion and recommendations from the analysis. We also give a picture of what we think would be a good future payment solution.

9 References
Here we have gathered all the theoretical references we have used in this thesis.

10 Appendices
In the Appendices at the end of the report all abbreviations and technical terms are summarized and explained.
2 Theoretical framework

Here we present the underlying established theories and strategies that constitute our theory-base for the process of forming our own theories. The reader is introduced to a number of fundamental topics that apply to the topic at hand.

2.1 LITERATURE AND THEORIES

Since this report will focus on payments for interactive services in digital TV we have searched for relevant literature both within the e-commerce field and the emerging field of interactive TV. We have found that the amount of literature is vast, especially in the field of e-commerce, but finding literature and theories discussing payment solutions specifically has been more difficult than we thought. Most of the available literature and theories are focusing on value chains and strategic issues, which is interesting within the context of our problem but not the core issue. After extensive research we have chosen five different sources of information that we will base this theoretical framework upon. The reason for using these five sources is that they have different focuses in regard to the starting point they use. Two of them cover mobile payments and two of the electronic payments in general while the last are specifically aimed at the iTV-industry.


2.2 METHODS OF PAYMENT AND PRICE MODELS

In this chapter we will outline some of the different basic methods of payment and price models that are available today. In the literature we have been studying we have found that these models are relevant to our later study.

2.2.1 Current methods of payment

There are numerous methods of payment available that consumers use in their everyday life. Some of these methods might be suitable for payment of interactive services and after having read the above mentioned literature we have recognized a number of payment methods that will be further explained in this section of our thesis. We will use the following three methods as a reference in our future study: payment cards, electronic cash/e-wallet and reverse billing. Some of these have sub methods and they will also be discussed, e.g. reverse billing can be used both over a fixed phone line and with a mobile phone.
Payment cards

Payment cards include both credit cards and debit cards but are limited to the cards that are used today with a magnetic strip.

A credit card can be described as a card where the balance owing on a cardholder’s account need not necessarily be paid at the end of the monthly period. The cardholder can pay interest on the outstanding balance and use the card for credit.\footnote{O’Mahony et al (1997)}

The other possibility is to link the card to a normal bank account, and to process the transaction in real time. This means that at the time when the transaction takes place, the amount is transferred from the customer bank account to the merchant bank account. This arrangement is called a debit card.\footnote{O’Mahony et al (1997)}

There is a large amount of card companies on the market but two major card companies, made up of large number of member banks, have come to dominate this worldwide business. These are VISA International and MasterCard.

Payment cards are designed to be used for payments over the counter in a shop. This means that the payments can only be made from a cardholder to a merchant who has pre-registered to accept payments using the card. The card companies themselves do not deal with cardholders or merchants, but rather license member organizations (usually banks) to do this for them. A bank that issues cards to their customers is called a card-issuing bank. They register the cardholder, produce a card incorporating the card association’s logo, and operate a card account to which payments can be charged.

Merchants who wish to accept payments must also register with a bank. In this case, the bank is referred to as the acquiring bank. When a transaction is made it has to be authorized. This will involve contacting an authorization center operated by or on behalf of the acquiring bank to see if the payment can go ahead. Assuming that it can be authorized, the payment completes.

All costs associated with a payment card transaction are borne by the merchant involved. The cardholder will only see the amount of the transaction on his statement, but the merchant typically pays a small percentage of the transaction value with some associated minimum charge that is divided between the acquiring bank and the card association. For this reason O’Mahony et al (1997) says that payment cards are not worthwhile for transactions where the amount is below a certain threshold, typically around US$2.\footnote{O’Mahoney et al (1997)}

O’Mahoney et al (1997) illustrates the different stages in a credit card payment process, as seen in the following figure.
The theoretical framework describes the different stages in a credit card payment process. The first process of authorization can be described as follows. The credit card holder gives his card to the merchant (1) who swipes the card and thereby transmits the authorization request to the merchant bank (2a). If the purchase is conducted online the only difference is that the card holder needs to enter the card number by himself on the merchant’s website. The merchant bank sends the request electronically to the Card Association\(^a\) (2b) which routes the request to the credit card issuer (2c). The issuer approves or declines the request and sends the answer to Card Association (2c) which forwards the response to the merchant bank (2b). In the last information transaction process the merchant bank sends the authorization decision to the merchant who completes the transaction (2a).

The clearing and settlement process takes place after the authorization has turned out to be successful. The merchant deposits the transaction receipt (Voucher) with the merchant bank (3) which credits the merchant’s account and submits the transaction to the Card Association (4). The Card Association then pays the merchant bank, debits the issuer’s account and sends the transaction to the issuer (4). The issuer posts the transaction to the cardholder’s account and sends the cardholder a monthly statement. Finally, the cardholder receives the statement and pays the issuer.

Another approach to payment cards is taken by Wright (2002) in his study on electronic payment systems.\(^4\) He discusses a credit card payment system where an

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\(^{a}\) The Card Association is the organization behind the card, e.g., VISA or Mastercard.
An electronic payment service provider (PSP) is used. The focus is on web-based payments and he suggests that due to security concerns and additional software requirements, some web merchants outsource the payment process to an electronic PSP. He also recognizes this form of outsourcing as a trend towards increased use of Application Service Providers (ASP). Some ASPs are only providing payment-processing services and they are then called PSPs. The cost for the merchant of using the PSP is normally based on the number and size of transaction. An overview of the payment card transaction process when a PSP is used follows below.

Figure 2-2 – Payment card transaction process with PSP. (Wright, 2002)

The only difference with this transaction process, in comparison with the one outlined by O’Mahony (1997) above, is that a PSP gateway is used for the authorization process, rather than the merchant and the merchant bank themselves. The actual order is still placed with the merchant but the order is passed on to a PSP which uses a gateway between the internet and the banking network. Wright (2002) suggests that three different methods of sending the customer’s credit card number can be used:

1. The card number is sent to the merchant and then passed on to the PSP. This demands a higher security level on the merchant’s web server but the benefit for the merchant is that it can file a database with customer details.

2. After redirection from the merchant web site the card number is sent directly to the PSP, as seen in the figure 2-2 above, which makes security issues less important for the merchant. In this case a customer database
cannot be built up by the merchant but it can be provided to the merchant from the PSP.

3. Wright (2002) also suggests that the international standard Secure Electronic Transaction (SET) can be used. This is a system that uses cryptographic keys where the customer sends the card number together with a key to the merchant who reroutes it to the PSP and a SET gateway. The issuing bank finally reads the card number with the key corresponding to the key issued together with the card. A disadvantage with SET is that it requires the customer to install SET software on the PC and that it can only be used with merchants that support SET payments.

So, why should the merchant choose to outsource the payment process to a PSP? In his study Wright (2002) has recognized four key advantages of outsourcing this function and he suggests that:

- The merchant does not need the costly procedure of being accepted as a payment processing entity by the banks and credit card companies.
- The PSP usually has IT backup facilities that automatically come into operation in the occasion of a unit breakdown.
- The merchants do not typically have enough server capacity to handle plenty of customers during peak hours.
- A regular web server used by a merchant does not usually have the required power to handle the cryptography and security issues associated with credit card transactions.

Electronic cash

Electronic cash is also known as e-cash or electronic purse and it can be described as a virtual prepaid account that allows the users to make payments over the Internet, as the case when it comes to interactive TV. O'Driscoll (2000) has identified a number of properties in order to make the e-cash system effective. These properties can be described as follows:

- Security – the system needs to be safe from falsification and any unwanted form of duplication.
- Time and place – the system should allow the customer to exchange e-cash when and wherever they want.
- Double spending – the system needs to incorporate measures to prevent and detect the occurrences of using the same e-cash to purchase goods or services more than once.
Some of the services and products provided over the STB will not cost very much and therefore O’Driscoll (2000) suggests that it is necessary to have a system that is suitable for handling small amounts of money. In the digital world this is often talked about as “micro-payments” which, according to O’Driscoll (2000), generally is defined to be less than US$10. Due to transaction costs it is suggested that payments that small are not economical for the merchant or service provider to handle via a credit card. This can be compared with O’Mahony’s (1997) suggestion that payments below US$2 are not worth to carry out with a credit card, see section payment cards above.

Reverse billing
Reverse billing, also known as reverse charge billing, is when the end-user is charged to the mobile or fixed line phone bill for a specific service or content. Typically a third party billing provider, PSP, is used to route the payments between the consumer, telecom operator and content provider, see Figure 2-3 below.

![Diagram of reverse billing](image)

Figure 2-3 – Principle outline of reverse billing. (based on Turner 2001)

Turner (2001) suggests that this model is favorable since the content provider does not need to establish its own billing relation with the end consumer, but instead uses an existing billing relation, in this case the relation between the telecom operator and the consumer. In this way the complexity of directly billing customers is removed and makes it easier for end-users to pay for content. Turner (2001) also suggests that this payment model heralds a significant step forward for sustainable revenue models for mobile content providers and that the main applicable services are SMS alerts and Multimedia Messaging Services (MMS). It is
however also possible to charge for other digital products using this method. Up to 2001 telecom operators in Europe have been reluctant to introduce reverse billing, but according to Turner (2001) more and more operators are starting to adopt this method of payment.7

**Premium rate number**

Premium rate numbers is already a well-established billing method in fixed telephony (known as 071- or 0900-numbers in Sweden). This method is normally also called premium rate interactive voice response (IVR). Callers navigate a series of choices in response to automated voice prompts by pressing keys on a fixed line or mobile phone. According to Turner (2001) numerous competition and chat lines have generated substantial revenues for content providers and fixed line telecommunication companies.8

Turner (2001) also provides an example when premium rate numbers are applied to mobile content where information can be requested to arrive as an SMS. It is commonly used for downloading mobile ring tones and logos from websites. When consumers dial the advertised phone line, the fixed telephone network operator charges a premium to his or her account. The network operator retains a proportion of this, while the mobile operator receives a cut for sending the ring tone to the consumer’s mobile. The remainder is fed back to the content provider.9

**Premium rate SMS**

Reverse Billing SMS is a process where small charges are made to a subscriber’s mobile phone in return for a service. Typically the subscriber calls or texts a short code SMS number, often including a keyword in the message and in return receives a service or a piece of information for which a charge is made on that subscriber’s cell phone.

Typical applications include taking part in quizzes on a TV-show and being charged for the privilege; subscribing to a football team’s news service and receiving video goal flashes at a goal; or entering a prize draw at the local supermarket.

A significant part of the revenue is retained by the mobile operator and the balance is transferred to the provider of the service, see picture above. The sums paid typically depend on the value of the reverse charge and the number of transactions per month.10
2.2.2 Price models

There are numerous different price models available to charge the customer for the use of different types of services. We have found four fundamental models that are being discussed in the studied literature.

**Per unit**

Price per unit is the most common pricing model used today. The principle is that you pay a fixed price for every unit of the merchandise. Price per unit is the traditional way of pricing physical products while the other pricing models are more common in today’s world of services and intangible products.\(^{11}\)

**Time**

Time is often used to price running services like phone calls. The price is linearly dependant of the time you use the service. Another example of pricing with time as base is car parking.

**Data Volume**

Data volume is a relatively new price model where you pay a fixed price for every kilobyte (KB) or megabyte (MB) downloaded. According to Turner this price model is currently the most commonly used to pay for data traffic to the mobile phone. Turner raises a couple of questions that needs to be addressed when it comes to data volume pricing. First of all this pricing scheme is unfamiliar to the majority of the customers and they need therefore to get over the threshold of accepting this way of pricing interactive services. Another important issue is the intrinsic value of different types of content when it is put in relation to its data volume. An important text document may have high value to the consumer but it requires low bandwidth, while MP3 music requires high bandwidth but is of low value to the consumer.\(^{12}\)

**Flat rate**

Flat rate is when you pay a fee to use a service for a fixed time. You can use the service as much as you like during that time. Monthly subscription to a service is one form of flat rate price model. Turner suggests that flat rate is attractive because many consumers will likely recognize this pricing scheme from the price that an ISP charges for fixed Internet. The drawback from the operator’s point of view is suggested to be the difficulty of introducing new charging methods for higher value services, since the consumer has become accustomed to the flat rate pricing scheme. Moreover, some content providers might not even allow flat rates due to legal issues.\(^{13}\)
2.2.3 Mobile payment models

The mobile commerce industry has experienced an immense development in recent years and a number of payment models have been developed. In a study from Wireless World Forum 2002 Brown & Dhaliwal (2002) have used the following model to compare different mobile payment models.\(^{14}\)

![Figure 2-4 – Comparison of mobile payment models. (Brown G, Dhaliwal J, 2002)](image)

The authors have used this model in order to facilitate a three dimensional analysis of the different mobile payment models that they cover in their report. The long term growth potential is relative between the studied models, the utility level tells the reader about the flexibility of the different models in the sense that it can be used for different kinds of purchases. The stage of development is simply how far the development has reached for the respective payment model. Micro payments and SMS Reverse Billing is used in a wide extent today while the other three have very limited use, e.g. the enhanced phone is only a payment model in a conceptual sense since it is not available today.\(^{15}\)

2.3 SECURITY

When choosing and designing a payment solution security is very important since the information is used to make real world money transfers. In our delimitations we have chosen to assume that the security framework AAA is fulfilled but we
believe that it enhances the understanding if the reader is aware of the basic principles of AAA. We will therefore describe these principles in this section. The identification process is the one visible to the consumer and therefore the different methods are explained in further detail.

2.3.1 AAA security framework

AAA is a computer security framework for controlling access to computer resources, auditing usage and providing the information necessary to bill for services. The abbreviation AAA is short for Authentication, Authorization and Accounting.

Authentication

Authentication is the process of determining if someone is who they say they are. Typically this is done by entering a valid username and password before access is granted. Knowledge of the password is assumed to guarantee that the user is authentic. See 2.3.2 Identification below for further details.

Authorization

Authorization is the process of giving someone permission to do or have something. Assuming that someone has logged into a computer operating system or application, the system or application may want to identify what resources the user can be given during this session. In the case of the STB this could be the process of checking if a user has enough funds available to complete a purchase of a service or goods.

Accounting

The final and for the payment solution most important part is accounting, which measures the resources a user consumes during access. This includes the amount of data sent and received as well as other services the user has utilized during a session. Accounting is carried out by logging of session statistics and usage information and can be used for authorization control, statistics and billing. 16

2.3.2 Identification

The first step in the AAA framework is authentication. This can in a more general term be described as the process of identifying a person to make sure that they are who they say they are. There are several ways of doing this without the presence of the person. The most common and suitable are described below.
Theoretical framework

Username and Password
In private and public computer networks (including the Internet), authentication is commonly done through the use of a username and a password. Knowledge of the password is assumed to guarantee that the user is authentic. Each user registers initially (or is registered by someone else), using an assigned or self-declared password. On each subsequent use, the user must know and use the previously declared password. The weakness in this system for transactions that are significant (such as the exchange of money) is that passwords can often be stolen, accidentally revealed, or forgotten.¹⁷

Smart card
A smart card contains more information than a magnetic stripe card (typically a VISA card) and it can be programmed for different applications. Instead of a magnetic stripe an electronic chip is used to store the information. Some cards can contain programming and data to support multiple applications and some can be updated to add new applications after they are issued. Smart cards can be designed to be inserted into a slot and read by a special reader. Together with a PIN-code a smart card can be used to identify a user much like magnetic strip cards are used today.¹⁸

Mobile phone
Another alternative to the traditional ways of identifying users is by using the mobile phone. The mobile phone penetration is very high in Europe and it is also something that people always carries with them. Therefore many believe that the mobile phone will play an important role as authentication device in the next generation of payment solutions.¹⁹

¹ O’Mahony et al, 1997
² Ibid.
³ Ibid.
⁴ Wright, 2002
⁵ O’Driscoll, 2000
⁶ Ibid.
⁷ Turner C, 2001
⁸ Ibid.
⁹ Ibid.
¹⁰ NetSecrets Ltd. 2003
¹¹ Turner C, 2001
¹² Turner C, 2001
¹³ Ibid.
¹⁶ TechTarget Inc., 2003
¹⁷ TechTarget Inc., 2003
¹⁸ TechTarget Inc., 2003
3 Research methodology

In this chapter we present and discuss the action science method that we have used and also how we have gathered information to our thesis.

3.1 ACTION RESEARCH AND ACTION SCIENCE

The terms action research and action science refers to the form of research when the researcher studies problems and business cases that are new and under ongoing development. According to Gummesson (1991) the definitions of the term action research differ between authors and he agrees with Argyris et al. (1985) when they propose that the term action science should be used instead. The reason being is that “action research” labeled projects has been closer to consultancy or journalism rather than properly fulfill the requirements of scientific research. The reason for mentioning this is that from now on we will use the term action science even though the term action research is widely used in the same context by other authors.

3.1.1 Action science classification

Gummesson (1991) provides a classification of the term action science and in this section we will give a brief summary of that classification.

- **Action science incorporates the two-folded approach of both solving an existing problem for a contractor and contribute to science.** As a researcher for scientific purposes you should put your results in relation to previous research and contribute to theoretical development of the studied issue. As an action scientist you are supposed to take your result to another dimension and both produce general knowledge and knowledge that later can be put into action and create value for your contractor.

- **During an action science project a holistic understanding is developed.** This means that the action scientist should focus on the totality of a problem and in the same time provide the involved parties with an understandable solution. Gummesson (1991) uses the term “optimally incomplete”, which we interpret as a solution that presents an understanding of the whole studied problem but with some parts more profoundly analyzed than others.

- **During an action science project the parties involved should learn from each other and develop their competence.** The action scientist should in other words both work with the development of her own ability as a consultant for the contractor and the contractor's ability on the action side and with transcending available theories into new and better theories on the science side.
According to Argyris et al. (1985) the latter is done by learning to reflect on available theories and then to design and produce new theories for reflection and action.\(^2\)

- *Continuous adjustments must be made in accordance with new information and new events and cooperation between the action scientist and the contractor is essential for action science.* Gummesson (1991) suggests that this is a natural way of working for the practitioner but somewhat unfamiliar to the scientist. A normal procedure in an action science project is to gather and analyze information about the different players in the relevant market. This leads to an iterative and cyclical process where the analysis leads to conclusions and recommendations that in turn lead to action. This process may be an unnatural way of working for a normal researcher but it is nevertheless important that the researcher adopts this method in order to fulfill the assignment as an action scientist.

### 3.1.2 Relevance to our study

After having read the theory about action science outlined by Gummesson (1991) it is our perception that his suggestions are indeed relevant to our study and can provide us with insightful knowledge on important aspects of the proceeding of this thesis. In this section we will provide our thoughts on why we believe so.

First of all we are not only writing this report for strict academic and scientific purposes but also to provide useful information to our contractor Ecton, that later can be put into action. However, we will also reflect on available theories and use them to progress with our work, which makes us both researchers for academic purposes and consultants for the practitioner. From Gummesson’s (1991) thoughts and from our beliefs that we are within the frame of what is to be considered action scientists, we have derived a number of guidelines that we think are useful in our future work with this thesis. These guidelines are as follows:

- It is important not to be blindfolded by the studied theory and instead open our eyes to the real world of our contractor.

- We should develop a relationship of mutual confidence with our contractor in order to get hold of the useful know-how available within the organization. This is especially important to us since the information about the studied topic is in many cases kept secret and hard to get hold of.

- We want this thesis to contribute to science in the sense that it could be used as a reference in future studies on interactive digital TV and electronic payment systems.
• Last but not least it is our objective to provide an understandable solution that explains the whole problem but due to lack of time it is a necessity to dig deeper in some topics and only scratch the surface in others, see 1.5 Delimitations.

3.2 Thesis Elements

There are many ways to conduct a research study and the research process can hence be described in many ways. After having studied Andersen (1998) we have found that his approach to research structure is suitable for our problem. Andersen’s (1998) structure model consists of the four core elements problem formulation, theory, empirics and conclusions and a number of connections between them. These connections consist of different forms of analysis and interpretation, see picture below.

**Figure 3-1 – The four core elements and their connections. (Andersen 1998)**

Andersen (1998) points out that the different parts of his research model do not need to be conducted in a chronological order and the problem formulation can for example in many cases be revised after having conducted a more profound study of the relevant theory. We believe that we do not have the knowledge base to initially create a final problem formulation and that it will be developed together with our increasing knowledge that we gain both from theory and field studies, e.g. empirics. This is in line with the theory regarding action science outlined in the previous chapter above.

3.2.1 Explanation of the four core elements

According to Andersen (1998) the problem formulation and discussion shall consist of the questions that the researcher wants answered. These questions can originate
from either the researcher or from contractors that are displeased with the present conditions and therefore want something analyzed. Since we are writing this thesis for an external contractor our problem formulation will primarily be derived from the problems we have discussed with representatives from the company.

The word *empiric* originates from the Greek word “empeira” which means experience. In other words, the empirics in a study consist of experience based observations made in the field. These observations can either be explained by the studied theories or enhance and verify them. The data from this field study can be divided into qualitative and quantitative data, see section “Information gathering” below.

The *theory* shall in this context according to Andersen (1998) consist of all existent knowledge within the area of study and it is quite natural that this knowledge has different levels of validation. Some of the knowledge might be validated on a universal basis while other is accepted only within a small group of people. The area that we are about to study is rather immature and under strong development which makes the theory both hard to access and it has probably not yet reached universal acceptance, if it ever will.

The answers to the initially defined problem formulations are the *conclusions* that we make from the conducted analysis. Hence, the answers are results of the whole process and constitute all the elements problem formulation, theory, empirics, analysis and interpretations. At this stage of the report we believe that we will find both the available theories and the empirics from our study useful when formulating our conclusions. Naturally the problem formulation is a necessity in order to be able to formulate any conclusions at all. ³

### 3.2.2 Pre study

In addition to the four core elements we have chosen to make a pre-study that contains an overview of the iTV industry. The reason for doing this is that we feel that it is important to have a general understanding of the main actors in this line of business.

The iTV industry has just recently developed and the general knowledge of the subject is relatively low and therefore the pre study also introduces the STB and the different services it will provide.

### 3.3 INFORMATION GATHERING

In this section we will describe how we will gather data and information that we later will use in our analysis. We will use both primary and secondary data as sources of information.
3.3.1 Qualitative and Quantitative data

Data is often divided into the subgroups qualitative and quantitative data. The difference between the two is the use of numbers. Quantitative data can be presented with numbers such as the percentage of the population in a Gallup survey that are against EMU or the average length of the Chinese population. Qualitative data can be notes from an attended meeting or answers to open questions with no specific answer alternatives asked at interviews.4

The area of payment solutions for interactive content in DTV is as we have mentioned before a rather new line of business and it has a few measurable components. Moreover, the knowledge base that could be of use to us is kept in a rather small group of people and organizations. Hence we believe that our study is more suitable for qualitative data collection rather than quantitative.

3.3.2 Primary data collection

In our case we need to have personal interaction with business professionals in order to better understand the problem. We will therefore conduct a number of personal interviews as the major source of primary data. This is perhaps one of the more time-consuming methods of data collection but it also enhances the process flexibility. Other ways of collecting primary data is for example through questionnaires with predefined questions but our opinion is that it restricts the flexibility of the data collection process. It is important to us to be able to evolve our interviews as we encounter new interesting topics as we go. This would be almost impossible if we would use pre made questionnaires.

Case study research

We are about to meet with a number of companies in order to get validity for our data collection. This often goes under the name of case study research. A core concept within case study research is the case study protocol, which is used to structure the data collection process. The case study protocol includes a number of guidelines that are to be followed in order for the data collection to be successful. It is said that if the case study research is conducted by using a case study protocol it increases the reliability of the results.5 Yin (2003) also points out that a multiple case study still more increases the reliability than if a single case study is conducted. In our case we have met with eight different actors in order to get information from different sources and angles. The companies we have met with and their role in the studied industry can be seen in the following table.
Table 3-1 – Summary and presentation of the studied companies.

<table>
<thead>
<tr>
<th>Studied Company</th>
<th>Role in the Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecton</td>
<td>Set top box developing company and also the contractor for the study.</td>
</tr>
<tr>
<td>SF Anytime</td>
<td>Media content provider with a focus on a Video on Demand service for movies, TV-shows etc.</td>
</tr>
<tr>
<td>Bredbandsbolaget</td>
<td>Telecom operator that provides Internet and telephony. Cooperates with SF Anytime on the payment solution for Video on Demand content.</td>
</tr>
<tr>
<td>TV4 Interaktiv</td>
<td>Provider of various types of interactive and digital content such as a game site and chat rooms.</td>
</tr>
<tr>
<td>Wallit</td>
<td>Payment outsourcing company.</td>
</tr>
<tr>
<td>Inap</td>
<td>Telecom management systems provider, including billing solutions.</td>
</tr>
<tr>
<td>Ericsson IPX</td>
<td>Payment intermediary for premium SMS and WAP payments. Cooperates with TV4 Interaktiv on premium SMS payments.</td>
</tr>
<tr>
<td>SEB</td>
<td>Large bank corporation and by that a key player when it comes to electronic payments.</td>
</tr>
</tbody>
</table>

When it comes to Yin’s (2003) suggested guidelines we have used a number of them and will in this section give a brief description of which of those we have used and to what extent. To start with it is important to point out that we have conducted a light version of the case study suggested by Yin (2003), who talks about the case study more of as a longer workshop. Our “cases” have been 1-2 hours interviews with business professionals. In the table below we have summarized the guidelines we have used and how we have used them.
Table 3-2 – Case study protocol guidelines. (Yin 2003)

<table>
<thead>
<tr>
<th>Yin (2003) Guidelines</th>
<th>What have we done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study questions, hypothesis and proposition.</td>
<td>In the problem discussion, purpose and purpose discussion of this thesis we have outlined the questions that we wanted answered through the case studies.</td>
</tr>
<tr>
<td>Theoretical framework for the case study.</td>
<td>We have outlined a number of theories in relation to electronic payments and also conducted a pre study to aid us in our choice of relevant market actors.</td>
</tr>
<tr>
<td>Role of protocol in guiding the case study investigator (is the protocol a standardized agenda?).</td>
<td>We have used a standardized document that we have based the interviews upon, but the specific questions have been different depending of which actor we have interviewed.</td>
</tr>
<tr>
<td>Names of sites to be visited, including contact persons.</td>
<td>We have used a document where we have lined out the desired actors to meet and who the contact persons are.</td>
</tr>
<tr>
<td>Data collection plan (covers calendar period of visits and amount of time assigned for each case study).</td>
<td>In the spreadsheet mentioned above we have written the date and time for each interview. We have not had a plan for how much time the summarizing of collected data from each interview should take.</td>
</tr>
<tr>
<td>Expected preparation prior to site visits (which documents are to be reviewed and where can they be accessed?).</td>
<td>Before each interview we have obtained basic knowledge of each actor (mainly by studying their websites). We have also put up a number of specific questions for each interview (some of them based on our standard document). Another preparation we have done is to send the issues we want to talk about in advance to the interviewee.</td>
</tr>
</tbody>
</table>


\(^2\) See Appendix B
3.3.3 Secondary data collection

We will throughout the writing of this report use secondary data resources such as industry reports and the Internet as a source of information. We see especially the industry reports as an appropriate source since the topic is quite new and the industry changes and development are made very rapidly.

1 Gummesson E, 1991
2 Argyris C et al, 1985
3 Andersen I, 1998
4 Ibid.
In this chapter we provide information about how a set top box works and how the consumer receives digital TV. We also explain the different roles of the components in the interactive digital TV industry and how they interact with each other.

4.1 THE DIGITAL SET TOP BOX

Historically, set-top boxes have been used to receive and unscramble analog transmission signals and to display these signals on a TV set. Digital set-top boxes will still fulfill this functionality, but its main use is to function as a receiver that receives the digitally transmitted content and transforms it into an analogue signal that the traditional analogue television can show. The DTV standard DVB (Digital Video Broadcasting) was developed in the early 1990s. In a digital broadcast data, pictures, and sounds are encoded as binary units of zeroes and ones. The main advantage of this is that TV broadcasts can contain a much larger amount of data, and many more channels can be broadcasted.

4.1.1 Different ways to receive DVB

Today there are three different ways that DVB is received: Digital Satellite Reception, Digital Terrestrial Reception (traditional antenna) and Digital Cable Reception. They differ mainly in the broadcasting and receiving technique. The techniques are not compatible and there will be different versions of STB's available on the market or STB’s with all three different interfaces. With all methods you get digital quality on your existing TV. The three methods through which Digital TV is transmitted are described in further detail below.

Digital Satellite Reception

Satellite reception is when the signal is received with a satellite dish on the house roof. The number of channels possible to receive is more than with any other method. Canal Digital and Viasat are two examples of satellite broadcasters in Sweden.

Digital Terrestrial Reception

Digital Terrestrial TV uses the same antenna used in most homes today. You don’t need a satellite dish or cable. One advantage of Digital Terrestrial is portability - in strong reception areas, a small set-top antenna can be used - ideal for caravanning, boating, and other on-the-go activities. In Sweden the government owned company Teracom handles the transmission and Boxer offers the required program card (see 4.1.2 Conditional Access) for receiving terrestrial transmissions.
Digital Cable Reception

Digital Cable uses the existing cable network that many homes and apartments are equipped with today. The only difference is that the transmission is digital instead of analogue. In Sweden ComHem and UPC are examples of two actors.

4.1.2 Conditional Access

Conditional Access (CA) is a technology used to control access to DTV broadcasts and services strictly to authorized users by encrypting the transmitted program.

A typical CA process involves three basic elements: the broadcast equipment, the set-top box, and the security module. The broadcast equipment generates the encrypted programs that are transmitted to the subscriber. When these are received, the STB filters out the signals and passes them to the security module. The security module then authorizes these programs for decryption. The programs are then decrypted in real time and sent back to the STB for display. The security module is usually embedded within the STB and accepts a smart card that the operator provides to decrypt the encrypted programs.

4.2 THE INTERACTIVE TV INDUSTRY

The delivery of interactive services through a TV set requires a number of cooperating players. These players can be said to consist of a combination of components from both the Internet and the TV/DTV industries. In order to understand the issues of payment solutions for interactive content we believe it is important to know which these components and actors in the STB environment are. Two different approaches to illustrate an overview of the participants in the set top box industry are presented in figure 4-1 and 4-2 below and a brief description of the participants will follow. We will not describe all different parts of the industry overviews below, only those that we find relevant to our study.

4.2.1 The interactive TV value chain

One way to illustrate the relationship between the actors involved in the interactive TV industry is to use a value chain approach. This approach together with explanations of the different components is presented below.
Content Developers
The developers of content aimed for interactive TV will mainly consist of TV producers and interactive content producers. The already established players in the area of TV content, such as sports rights holders and TV production companies, will remain the content owners for the traditional TV content. Players that have become adept at producing content and applications for Internet services are likely to consider the opportunities offered by digital TV. The re-versioning of content that was originally intended for Internet via PC services, and the creation of new interactive services designed to appeal to the mass TV audience, are suggested to become core competencies.6

Broadcasting channels
The role of the broadcaster has traditionally been to select among available content and schedule it for viewing at specific times. With interactive TV entering the scene it is suggested that broadcasters are to seek out the opportunities in this new market and strive to become the portal of the TV screen. Hence they will facilitate the distribution of content and make it more accessible to the audience. Naturally they will continue to provide passive TV to the consumers and endeavor to retain the role of packaging attractive services, and guiding the user towards others.7

Internet portal providers
In the same way that broadcaster will explore the opportunities within the interactive TV market, already established Internet portals in the PC or wireless
Internet markets are also starting to weigh up their options in the new digital market.\textsuperscript{8}

**Internet service providers (ISP)**

The ISP industry has undergone tremendous consolidation in recent years, with many players being acquired by telecom operators, such as the Swedish telecom operator Song Networks’ (previously Tele1 Europe) acquisition of the ISP Wineasy in 1999.\textsuperscript{9} Internet service provision is now less about access-only service and increasingly about the provision of content and value-added services. The ISPs will assumingly continue to play an important role when it comes to delivery of services in the new interactive TV industry.\textsuperscript{10}

**Digital TV platform service providers**

These players have the front-end interface with the consumer. They provide the service package to the customer and bill for it accordingly. To date, digital TV platform service providers have tended to link their services with a single delivery system such as terrestrial, cable or satellite. One example on these players in the Swedish market is Boxer.

**Broadcast transmission network operators**

According to Brown (2001) broadcasting transmission is an efficient system for delivering high-bandwidth signals to a large mass audience. This is usually done via cable, satellite or terrestrial transmission devices, see section 4.1.1 above. The new media services will require high bandwidth and the broadband capacity of the networks is therefore essential for delivery of these new services to the home. The main barrier to interactive service provision is the current lack of broadband return paths. Cable has the greatest potential to provide such capability, once networks have been upgraded. In the meantime, broadcast transmission must be complemented with the telecommunications network in order to allow return-path functionality.\textsuperscript{11}

**Telecom network operators**

To date, the Internet has been heavily based on the telecom networks. Telecom operators have become skilled players in the Internet sector, branching out into Internet service provision and portal activities. According to Brown (2001) the commoditization of bandwidth is redefining the economics of the traditional business within the telecom market, as transport of traffic becomes the least expensive component of providing services to customers. As bandwidth becomes a commodity, telecom operators will no longer simply be providers of transport products. Carriers will probably not charge for bandwidth or for minutes of use,
transmission will become a cost component of a greater service. Fixed network operators offer customers directly connected access to a wide range of telecommunications services. In most countries, these operators are also long-distance operators and ISPs and many are now moving into the digital TV market.\textsuperscript{12}

4.2.2 The computing paradigm approach

To date the IT world has experienced three main computing paradigms, the centralized computing paradigm with mainframe computers, the distributed computer paradigm with PC-based computing and the network centric computing paradigm with server focused solutions. Now it is suggested that a new paradigm is evolving which is based on a STB and a standard TV-set. The following industry illustration describes the actors surrounding the STB and its inner computing paradigm.\textsuperscript{13}

![Digital STB computing paradigm](image)

This overview illustrates partly the same actors as the interactive TV value chain above and the additional contribution to us is the area of international standards and the approach to illustrate the industry in itself.
4.3 APPLICATIONS AND SERVICES

A STB with its expanded functionality with a broadband connection and enhanced processing power (as the one Ecton has developed) increases the number of possible services to the consumer enormously. The most important and in characteristic different services are listed below.

4.3.1 Electronic Program Guide

The electronic program guide (EPG) is an application made to facilitate the iTV usage. The number of DTV channels is growing beyond 200-plus channels in many cases, which makes channel surfing harder to handle. The EPG tackles this issue by providing TV program listings than can be navigated by viewers with the remote control. Guides allow viewers to find television shows by genre, theme, and title or time slot. This application comes with the graphical user interface (GUI) of the STB and is usually free of charge.\[14\]

4.3.2 Time Shifting

Time shifting is defined as any service that allows viewers to personalize and watch television when they want to through a local storage device, such as the hard disc in the STB or a server centric solution, e.g. video on demand (VOD). The broadband connection in the STB enables the possibility to have true video on demand where the user without delay can watch a movie or specific program streamed over the broadband connection. The content is available at anytime for the user.

4.3.3 Enhanced Broadcasting

Enhanced broadcasting is a broad category that encompasses a multitude of different interactive applications. Simplistically, enhanced broadcasting combines data and video applications that allow consumers to interact with TV-programs. Examples of enhanced broadcasting applications are sport statistics and the request for information to be layered on top of a running TV program. Other applications could be to call for instant replays of sport events, choose which advertisement the viewer wants to see or to vote for the best player in a hockey game. With a return channel that is available all the time shows on TV could use that channel instead of as today using premium rate SMS and phone number. With one click on the remote control you could interact with the current TV show (i.e. vote on your favorite soap opera contender or participate in a quiz).

Online betting is also a form of enhanced broadcasting but regulations demands that all betting is done with a prepaid account (not credit).\[15\]
4.3.4 **T-commerce**

While viewers can purchase goods via services such as TV Shop now, consumers must pick up the phone and place a telephone call to order the product. With T-commerce, the two-way interactivity eliminates the hassle of placing the phone call, and will make shopping over the television more compelling. The return channel could be used during commercial break to do shopping or reservations of goods or services.

4.3.5 **Internet over the Television**

As the category name implies, Internet over the Television services allow consumers to surf the Web over the television usually with the aid of a keyboard and typically for a monthly subscription.

4.3.6 **Voice over IP**

The addition of a headset or microphone could easily turn the STB into a phone using the broadband connection to make the phone-call.

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1 Brown, 2001  
2 Boxer AB, 2003  
3 Nokia inc., 2003  
4 TechTarget Inc., 2003  
5 Brown, 2001  
6 ibid  
7 ibid  
8 ibid  
9 Jupitermedia Corporation, 2003  
10 Brown, 2001  
11 ibid  
12 ibid  
13 O'Driscoll, 2000  
14 Meeting with Ecton 2003-09-30  
15 Lotterilagen (1994:1000), 2003
5 Analysis models

Here we present the analysis models that we later will use. The first step is to analyze the requirements regarding price models and payment methods for the services and the flexibility of the payment solutions respectively. The second step illustrates the relative flexibility level and stage of development of the studied solutions.

5.1 SERVICES IN INTERACTIVE TV

In the theoretical framework of this thesis we identified a number of payment methods and price models that are much talked about in the studied literature. Our aim is now to show how we developed an analysis model that will support us in determining which payment solution is most suitable for services provided over a digital STB.

The first thing we wanted to do was to develop a model that in some way incorporates both the different parameters of the price models and the different payment methods. What we also thought of were the different services that the consumer ultimately will pay for. These services have different requirements of price models and payment methods and therefore we will in the analysis chapter categorize some possible services into groups with similar requirements.

In order to illustrate to the reader how we want to use the analysis models later in the analysis chapter we will further in this section exemplify the analysis models and call these service groups Service A, Service B. There are also two payment solutions that are used to exemplify the analysis models; Payment Solution C and Payment solution D.

In the studied theory we have not found any relevant models that could be used for this specific problem so we needed to construct our own model that supports an analysis of the above mentioned parameters. The solution we came up with was to construct a matrix with the different price models on one axis and the different payment methods on the other. The different services can then be mapped onto the matrix to illustrate which type of method and price model that are needed most, see figure 5-1 below. The illustrated example below shows that Service A only can be charged with an per unit fee but all different payment methods can be used. Service B can only use an e-wallet solution but can be charged for with all different price models.
5.2 PAYMENT SOLUTION FLEXIBILITY

One of the key objectives with this thesis is, as stated in the purpose, to find a flexible payment solution and the above illustrated model can also aid us in that mission. As a part of our study we will interview a couple of Swedish PSPs in order to get a better understanding of the different methods of payment they provide. One PSP might support several different price models and payment methods and we will then define such a solution as flexible. This can be illustrated by using the model above and, instead of mapping the service, map the specific solution onto the matrix where the payment method and price model correspond to the features of the studied payment solution, see figure 5-2 below. In that way we can determine all the solution’s relative flexibility by comparing how many different payment methods and price models they support.

<table>
<thead>
<tr>
<th>Price Models</th>
<th>Per unit</th>
<th>Time</th>
<th>Data Volume</th>
<th>Flat rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse Billing</td>
<td>Service A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment Cards</td>
<td>Service B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e-wallet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5-2 – Analysis matrix for payment solutions in interactive TV, shown here with two examples of payment solutions.
5.3 PAYMENT SOLUTION SUITABILITY

The second step in our analysis is to use the model developed by Brown & Dhaliwal (2002), see section 2.2.3 above. Their model is however not fully optimal for our purpose and therefore some changes need to be made. The reason is that we have limited resources for determining one of the three dimensions in their model – the growth potential of the different payment models. What we on the other hand believe is feasible is to change the third dimension from analyzing the growth potential to analyzing the suitability of the payment solution for currently thought of services in iTV. This can be done by comparing the service requirements matrix with the payment flexibility matrix above. If we define the suitability of a payment solution as how well it conforms to the service requirements, we can then compare the matrices and see how many payment methods and price models supported by one payment solution that matches the requirements of the services provided over the STB. The solution that supports most service requirements can finally be said to be the one most suitable for iTV today.

That in itself may not however tell us which solution to recommend because the solution might not yet be fully developed. Therefore Stage of development is defined as a combination of several factors. The most important factor is the availability of the payment solution on the market today.

To have a flexible solution that supports payment methods that are not required by services today may also be something to take into account due to the future service development. The future services will perhaps require payment methods not required today and it will then be a benefit to already be affiliated with a solution that can be expanded to cover other desired payment methods.

Figure 5-3 below illustrates the last step of our analysis model.
Figure 5-3 – Analysis model for different payment solutions in interactive TV, shown here with three examples of payment solutions.

This matrix is then used as the basis for discussing our conclusions and recommendations to Ecton.
6 Study

In this chapter we present the information that we have gathered in our field study. A number of industry actors have been interviewed in order to provide us with necessary information that we later will use in our analysis. The study is divided into two parts with regard to what type of actor the studied company can be considered to be. The two parts are; The Interactive TV Industry and Payment Solutions.

6.1 THE INTERACTIVE TV INDUSTRY

As described in the pre study chapter of this thesis the interactive TV industry consists of a number of players. In order to get an understanding of how these players interact and what they think of the payment solutions for interactive services we have conducted a number of interviews. We have met with our contractor and STB developer Ecton, the content provider SF Anytime, the ISP Bredbandsbolaget and the subsidiary of the TV Company TV4, TV4 Interaktiv.

6.1.1 Ecton

The STB that Ecton is developing has in addition to the required DVB-receiver some enhanced features that expand the possible applications for the STB. There will be several versions of the STB but they all share some common characteristics that are outlined below.

**Home entertainment center**

The STB from Ecton is a replacement for a lot of equipment in the home and can replace the following machines; DVD-player, CD-player, Video Cassette Recorder (VCR) and a home computer. All these functions are integrated into one single unit.

**Enhanced processing capabilities**

The STB is essentially a computer with an additional DVB-receiver. It has a processor, memory and a hard drive. This means that it can be used to a wider array of applications like Internet browsing, picture viewing, music listening, gaming and personal video recording (PVR). The STB has its own graphical user interface (GUI) that is custom made in order for it to be shown on the TV and easy to use with a remote control.

**Network connection**

On the back of the STB there is a regular network connection which should be connected to a broadband connection. This makes the STB connected to the Internet full time. This return channel expands the possibilities for interactive TV
broadcasting by ensuring that the return channel is available all the time and with sufficient bandwidth. The number of services that can be delivered to the home is greatly expanded.

**DVD-player**

A DVD-slot on the front makes it possible to watch DVD-movies like on a regular DVD-player. It also enables the STB to function as a CD-player to play regular audio CD’s.

**Conditional Access in software**

Ecton has a wish to implement Conditional Access (see 4.1.2 Conditional Access) in software instead of in a smart card as it is solved today. Their hope is that this will increase security and remove today’s problem with pirated cards that makes the cable operators lose revenue. The principles of software CA are the same but the omitting of a card makes the copying and tampering of the secret information much harder.

**Voice over IP terminal via Bluetooth**

The STB from Ecton will include an access point for Bluetooth. This will enable the connection of a Bluetooth Headset of the same type that is used today with mobile phones. With the headset connected the broadband connection will make it possible to place and receive regular phone calls over the Internet. The technique used is called Voice over IP (VoIP) and is a standardized method for using the Internet instead of traditional phone lines when making phone calls. VoIP is not limited to only communicating with other entities over the Internet, it will be possible to talk to people that have a traditional phone at home.

**Dynamical GUI**

Ecton has developed its own GUI for the STB. The GUI is adapted to be viewed on a TV and to be easy to navigate with the remote control. One of the more important features of the GUI is the possibility for Ecton to modify its appearance even after the customer has received the box. The broadband connection is used to transfer the updates to the STB and this expands the possibilities for Ecton to offer new services to the user even after the release of the box.

The primary advantage with the dynamical GUI is that a new external service-provider easily could offer new services to the end consumer even without their

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*a Bluetooth is a wireless technology that provides radio links between all types of electronic equipment.*
interaction. The service would just appear in the GUI one day for the consumer to use.

**Services provided via Ecton STB**
The following services will be provided in the GUI with the first release of the box:

- VoD - Video on Demand
- Music download and listening
- VoIP - Voice over IP
- Internet browsing
- Download photos from a digital camera and browse them on the TV.
- EPG – Electronic Program Guide
- PVR – Personal Video Recorder

**6.1.2 SF Anytime**
SF Anytime offers VoD-services through a broadband connection and was founded in February 2003 as a subsidiary of the Swedish media group Bonnier AB. They offer movies from SF*, recorded TV-programs and documentaries. The only technical requirements for the consumer are a computer and a broadband connection. The movies are streamed directly to the user without the delay of downloading the entire movie prior to viewing it. The quality of the movie depends on how fast the broadband connection is but in general it has the same quality as a VCR-recording or better. Once a movie is paid for it can be watched an unlimited number of times during 24 hours. When it comes to broadcasting TV channels they have the technical requirements to provide them over Internet but they have not yet launched that product.

The primary goal for SF Anytime is to get VoD into the television. They have however not yet fully launched their product on the market and the reason is that the prices of available broadband STBs are still too high. Today the service is delivered to a computer that in turn could be connected to a television but that requires extra equipment for the end consumer. It is likely that VoD will be delivered through a STB with broadband connection in the future since the STBs are connected to the television at all time. Therefore SF Anytime follows the development of new more advanced STBs very closely.

*a Svensk Filminustri – Sweden's largest producer and distributor of movies.*
Payment methods in use

SF Anytime has different payment solutions depending on how you access their service. Their general payment solution is offered through SpaceCoin. SpaceCoin offers a solution with a form of electronic purse where you could choose between a monthly withdrawal from your payment card or a traditional invoice. All services bought through SpaceCoin are in other words paid for afterwards on a monthly basis. About 90 percent of the customers are using the traditional invoice as a method of payment.

SF Anytime also cooperates with all the major Swedish ISP’s to offer VoD to their customers. What this usually means is that the agreement between the ISP and the end consumer is used for the settlement of payments which makes the ISP the owner of the monetary flow. In this case SF Anytime has to adapt their systems to the ISP’s payment solution, a process that is both costly and time consuming. SF Anytime have to account for how many movies of each title they have distributed on a monthly basis and they would therefore rather have just one payment solution for all their customers if that would be possible. In general the ISP is however reluctant to give away customer information and therefore wants to take care of the billing by themselves.

To illustrate the solution when an ISP is used we can take an example when a consumer is using the Swedish ISP Bredbandsbolaget as a broadband provider. The user begins the session by entering Bredbandsbolaget’s website and follows the link to a co-branded SF Anytime site. By logging in with the username and password that was received when the broadband connection was established, the user can start to view a movie or TV show from SF Anytime. The cost of the service will be charged on the monthly or, most frequently in use, the quarterly bill for the broadband from Bredbandsbolaget. This means that it in most cases take almost four months before SF Anytime receives their payment.

Price models in use

SF Anytime is currently only using per unit payments as a price model. We asked if it could be possible to use a flat rate price model for their products so that the consumers can watch as many movies or as much TV as they want during a fixed period of time. The response was that it would most likely be doable, but it would be a big problem to later arrange with the fees to the movie rights owners and therefore SF Anytime does not like the idea of using that type of price model for movies. For traditional TV channels on the other hand it is more of a standard to use the flat rate price model.
General discussion
When it comes to Ecton as a STB developer and content distributor, SF Anytime believes that it is hard for a small company to distribute content. They take the telecom giant Nokia as an example and states that they did not succeed in their attempt to distribute content a couple of years ago. The reasons could be many; that they were too early could be one. Perhaps it is easier today but it is hard to tell.

Regarding payments for distributed content SF Anytime believes that the STB distribution must be immense before the ISPs releases its control over payments.

6.1.3 Bredbandsbolaget
Bredbandsbolaget AB is a Swedish ISP delivering broadband connections to consumers. The company was established in 1998 and their business concept is to provide Swedish households with network connections, through which they provide broadband connection to the Internet and telephony services.

In the beginning of the interview it was stated that the market for broadband services is still immature and rather young, which leads to an uncertainty in the industry regarding what will happen in the future. Today Bredbandsbolaget is focusing on access only services and the two main product areas are Internet access and IP telephony. A couple of years ago people in the industry talked widely about the thought that the access services would not be the most profitable product of an ISP. Instead it was suggested that the cash cow would be the content and services that could be provided to the end-consumer over the broadband connection. This is however not the fact today. However, when the price of available STBs has reached an acceptable level from the consumers’ point of view, Bredbandsbolaget wants to deliver TV over the IP network as well.

Development of STBs and related products
The development of products that can support the delivery of services over the Internet has often been lead by visionaries and engineers with a big interest of related technology. Instead of conducting a market research and finding out what the end-consumer wants to buy, the development has continued with products entering a market with rather limited demand as a result. When it comes to STBs there has been a trend towards all-in-one boxes so that the consumer shall be able to replace many TV related appliances with one – the STB. What often is forgotten in relation to this is that different market segments demands different content and different levels of inbuilt technology. This makes it difficult to package the STB to suit the needs of many consumers. As a small industry actor it is especially tough since there are a number of major players with huge resources
awakening and entering the market, e.g. Microsoft, Sony, Fujitsu-Siemens to mention a few. Despite this a possible way to be successful as a small actor is to cooperate together with one or two larger players in the industry. One could be a content provider and the other an ISP or broadcasting company.

**Services and payment solutions**

Consumers today have become accustomed to download movies and music and business professionals in the interactive media industry see a great potential to benefit from that. There are however number of problems related to this topic. When it comes to VoD and movie rights ownership the movie producers have predefined time slots in which they release the movies. First the movie is released on cinema and then it is released on video/DVD. The latter is the line of business that is the most profitable for the movie rights owners and the question is when are the movies to be released for VoD? Another problem is related to quality. Since the quality of the movie, if distributed over the IP network, is dependent on a number of players it will be hard to assure a certain quality to the customer.

When it comes to payment for the services delivered through the IP network to the STB we are told about the solution where the service provider cooperates with Bredbandsbolaget and the end-consumer is charged on his Internet invoice for the used services.

Another solution is the one used by Microsoft together with their gaming console X-Box. With X-Box the consumer can play something called X-Box Live over Internet. This cannot be done without entering the payment card details. These details are then stored and the cost of using the services related with X-Box Live will later be automatically withdrawn from the account associated with the registered payment card.

**6.1.4 TV 4 Interaktiv**

TV4 Interaktiv is a subsidiary of the Swedish TV channel TV4. They develop interactive content and maintain the teletext* service, the web site TV4.se and in October 2003 they released their gaming site blip.se. The web site TV4.se is varying between the fourth and fifth most visited media site in Sweden and the most popular service provided by TV4 Interaktiv is teletext, which is used by around 1.9 million unique viewers each month.

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* In Sweden teletext is known as Text-TV.
Services and payment solutions

In this section we will give a brief description of the services provided by TV4 Interaktiv and the used payment solutions associated with each service.

Teletext

As stated above the teletext service is the most widely used service that TV4 Interaktiv provides and the revenue stream comes from both a very popular teletext chat and advertising. The teletext chat room is a chat where the users send a SMS to a specific number and the sent text appears on the teletext page in the TV. The payment solution used is a SMS-based solution with reverse billing features developed by TV4 Interaktiv.

Interactive TV

Everyday consumers can take part in quizzes and different types of voting on the TV screen by using a premium rate number. TV4 Interaktiv handles these services for TV4 and the consumers can usually use a premium rate number or a SMS to vote or take part in a quiz, i.e. also here reverse billing solutions are used.

There are no standardized payment solutions or methods for interactive DTV today and TV4 don’t think there will be anyone available soon.

Gaming

In October 2003 TV4 Interaktiv launched the gaming site blip.se where the consumer pays a subscription fee that enables him to take part in the different games on the web site.

In some games it costs extra to use certain features and some costumers tend to get annoyed about this because they believe that they already have paid for the service through the subscription fee. Other extra products such as tournaments also cost extra but that seems to be ok with the customer.

To pay the subscription fee customers can use SMS or IVR phone billing systems developed by TV Interaktiv. Additionally there is an e-wallet solution provided by the Swedish company PayNova, a payment card solution or a direct bank payment through the customer's own bank. The two latter are provided by the Swedish PSP Wallit. It is also possible to use reverse billing by paying through a SMS or premium rate phone number. How it works in practice is in fact that the payment card and direct bank payment solutions only become available for the user when the amount to pay has reached a certain level. Otherwise the e-wallet and reverse billing solutions are used.
Internet portal

On the web site TV4.se there are several SMS based chat rooms, e.g. a dating chat, and customers can download ring tunes and pictures to their mobile phone by sending a SMS, i.e. also here the reverse billing method is used.

Consumer perspective

TV4 Interaktiv believes that the ultimate payment solution from an end consumer perspective is one where the consumer does not need to leave the used media in order to make a payment. The form of payment must also be developed with an easy-to-use criteria and it should be reliable. One other important feature of payments is for instance so called “invisible payments” where the media distributor takes care of logging the purchase without the interaction of the end user, e.g. when the broadband distributor provides VoD-services and afterwards charge it on the bill for the broadband connection.

Even though the ultimate payment solution would be a built-in one, it is strongly believed that the mobile phone and SMS reverse billing will be an important source of payment for TV4 Interaktiv because the consumers are so familiar with using their mobile phone. The disadvantage associated with this form of payment is that it can only be used for small amounts. Even if it would be possible to charge larger amounts it would be “psychologically” difficult for the consumer to pay more than the today maximum 30 SEK for a SMS.

When it comes to TV4 Interaktiv’s gaming site, blip.se, the company is surprised that the direct bank payment method has been widely used by the initial customers. Direct bank payments can be described as a special form of payment that instead of using a universal solution like a Visa-card uses a direct connection to the end customers on-line bank service to make the transaction. TV4 believes that the reason this type of solution is being widely used could be that the banks in Sweden are building an interactive payment behavior through their e-banking solutions*, which most likely drives the usage of non-free interactive services as a whole. The disadvantage for the service provider when the customers use this method of payment is that each transaction generates quite high fees that need to be paid to the bank.

For sites like blip.se the flat rate price model is unsurpassed because it is easy to handle technically and once the consumers have started to subscribe they tend to continue. When we asked what TV4 Interaktiv thinks of time-based price models

* A solution that enables the consumer to perform private banking issues over the Internet instead of at the local bank branch.
they believe that they demand more advanced technique and therefore are more time consuming to develop and maintain.

**General discussion**

When we talked about DTV in general the TV4 Interaktiv representative said that at the most recent TV fair in Amsterdam there was a lot of talk about broadband TV rather than DTV. It is believed that there are two paths to follow in this industry where DTV is one and broadband TV with IP networks the second. TV4 Interaktiv is focusing more on IP rather than DTV and they have already been approached by STB-distributors.

DTV will of course be a major channel for TV4’s content, but open platform support for interactive applications and standardized payment solutions seems to be hard to implement by the industry.

Whether broadband TV or DTV will be the future standard the prices of today’s STBs can be a counteracting force for the development of the industry.

6.2 **PAYMENT SOLUTIONS**

To get an understanding of how different PSP’s act on the market and what they think of payment solutions for services in iTV we have interviewed three PSP’s and one bank.

The three PSP’s we have met are; Wallit, Inap and Ericsson IPX. We also met the bank SEB.

6.2.1 **Wallit**

Wallit AB is a Swedish company that was founded in 2000 by the payment outsourcing company Faktab Finans AB. Wallit works with payment solutions adapted for e-commerce. It is a rather small company with around 15 employees but the partnership with Faktab enables them to offer a complete portfolio of solutions aimed at net centric payments. Faktab provides all the general services needed for payments like invoice service, credit information and billing, while Wallit offers the technical solutions needed to make purchases over the Internet or any other interactive digital connection.

**Wallit API**

The most common solution provided by them is Wallit API\(^*\). The Wallit API offers the possibility to make both card payments and direct bank payments from a number of different electronic platforms. The Wallit API can for example be

\(^*\) API – Application Programming Interface; a predefined interface with programming functions.
implemented in a broadband STB. The company that buys the API solution from Wallit need however to develop the price model intelligence by themselves.

The principle information and monetary flow for the API solution is outlined in figure 6-1. In practice Wallit and the merchant sign a general agreement and then Wallit signs an agreement with each of the content providers. The money received from the transactions goes into a Wallit owned account unique to each client. From that account the money is transferred to the client and the various content providers. As a PSP Wallit cooperates with a card acquirer and they are the only PSP in Sweden to offer a direct connection to BABS. This means that Wallit can verify a payment card number in real time against the card issuing bank in about 1 second. It is important that this process can be performed 24 hours a day, all year around and Wallit has therefore incorporated double hardware for backup all along the infrastructure.

Figure 6-1 – Principle monetary and information flow in the payment solution from Wallit.

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a BABS is a Swedish card acquiring company for the large card associations Visa, MasterCard and American Express.
### Invoice distribution

Together with Faktab Wallit also offers a more traditional solution where an invoice is sent periodically to the consumer. The payments can be connected to an already existing billing relation, e.g. the monthly invoice for the rent for the STB.

With this solution Wallit takes care of the monetary stream and the distribution of invoices. When the invoice is paid Wallit handles the monetary flow to all the different service providers that the merchant has. This flow of money is the same as shown in figure 6-1.

### Payex

Payex is a separate e-wallet solution that works as payment switchboard on top of a micro payment platform. The solution is developed by the Norwegian company eSolutions AS. It offers an e-wallet for all online and mobile commerce that could be connected to many merchants offering services, content or products. The advantage for the merchant is the unified interface to the customer and the possibility to offer all the different payment methods in one solution. If the consumer shall be able to use the Payex e-wallet, the merchant from whom the consumer wants to shop, must be connected to Payex. In Norway many of the online merchants jointly agreed to choose Payex as the e-wallet to use.

The wallet is a unified solution for the consumer where their on-line purchases are gathered and it also offers different kinds of payment methods depending on what kind of purchase is to be done. The different payment methods are:

- **Payex-Account**: Electronic wallet for purchases up to 125 Euro
- **Payex-Credit Card**: Charge amounts directly to consumers credit card
- **Payex-CPA**: Payex offer premium rated sms toward all Scandinavian operators
- **Payex-Gift voucher**: Issue gift vouchers to be used at dedicated merchants
- **Payex-Pre Paid Voucher**: Electronic Value Codes
- **Payex-Direct Debit**: A Direct Debit service toward consumers bank account

Wallit will in all the above methods take care of the monetary stream and handle all payments like an intermediary with possibilities for both the merchant and customer to view all their transactions through an interface provided by Wallit.

Identification in Payex is possible with regular password and username or with a special solution where the purchase is acknowledged with a SMS.
General discussion

We had a general discussion with Wallit about payment cards and they provided the information that payment cards are by far the most common payment method used for online payments today. However they also said that there still are people that are reluctant to use payment cards on the Internet today but the willingness to use the payment cards online will most likely increase in the upcoming years.

6.2.2 Inap

Intelligent Applications AB (Inap) develops, implements and operates Telecom Management Systems and something they refer to as Intelligent Network services (IN-Services). The services they provide are targeted and specialized to be used by telecom operators of different types. Their primary customers are Service providers, Virtual Operators and Network operators (Mobile, Internet and fixed-line).

Telecom Management Systems includes Provisioning, CRM and Billing Systems primarily aimed at small to medium sized Service Providers. The IN-Service portfolio for Network operators includes services like Number portability, Call routing and Access Screening.

Telecom operators are according to the interviewee very good at charging the customer for all the provided services as compared to service providers on the Internet where most services traditionally are free of charge. Telecom operators also have a tradition of offering high quality services with little or no downtime. This is something that the Internet industry could learn a great deal from according to him.

Incapo OneWallet

Incapo AB is a subsidiary of Inap and offers a payment solution called OneWallet developed by the American company C-SAM.

OneWallet is a device-centric wallet application that resides on the consumers own device; a mobile phone, a PDA or a PC. The OneWallet stores personal information and a wide range of previously physical cards in electronic format like payment cards, health/auto/life insurance cards, identity cards (driver’s license, passport), membership/loyalty cards, etc. The aim of the OneWallet is to allow secure electronic storage of any card that is currently in the user’s physical wallet.

The main target in Sweden for Incapo is the mobile operators that would offer OneWallet to their customers with a pre-paid subscription as an easy way to refill

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* Personal Digital Assistant
their accounts. Incapo sees this as a good way to reach out to the consumers and gain acceptance for the solution.

6.2.3 Ericsson IPX

Ericsson Internet Payment eXchange (IPX) is a payment solution developed and provided by Ericsson. Its main purpose is to offer a simple payment solution for providers of digital content or services. They do this by working as a connection aggregator between mobile operators and service- or content providers. The service could be offered directly to a mobile phone or through a regular computer connected to the Internet.

The payment method is based on reverse billing either through a premium SMS or the invoice/pre-paid card for the mobile phone if the WAP-browser in the mobile phone is used. For this purpose IPX has agreements and technical set-up with a number of mobile operators globally offering a uniform API for the content provider to use as a payment solution. A principle sketch of the flow of information is outlined below.

![Figure 6-2 –IPX's role between the Operators and Content Providers. (Ericsson IPX, 2004)](image)

IPX offers both payments directly with one click using the WAP-browser in the mobile phone or by sending a specially formatted SMS to a specific number. When the SMS arrives to IPX they notify the service provider through the IPX API and the consumer can use the service or download the content.

The identification of the consumer is done with the mobile phone by determining the phone number (MSISDN) of the mobile phone. This number can be determined in two ways. The first option is by SMS, the user sends an SMS to a specific number and IPX then uses that SMS in the identification process. The second option is when the user uses the WAP-browser in the phone and access an IPX-enabled service. The operator then provides IPX with the identity of the consumer. With WAP-browsing the identity of the consumer is usually hidden.
from the service provider but IPX has agreements with the operators that give them the possibility to receive the identification string.

In Sweden the maximum amount that can be reverse billed over SMS is 30 SEK. The Swedish operators take between 20 and 30 percent of the paid amount as fee before IPX or the service provider gets their money. According to IPX the low maximum amount together with the fact that mobile operators margins on SMS traffic is rather high in Sweden makes the IPX solution most suitable for digital content where the marginal cost is low.

One other application for the IPX solution could be to use the SMS identification process to uniquely identify the consumer and with that information charge the consumer on a separate bill or any other method of payment. The cost of sending an SMS in Sweden is about 1 SEK which the consumer would have to pay but the advantage is that everyone knows how to send an SMS and almost everyone in Sweden has a mobile phone.

IPX make agreements and develop solutions to interface with all the GSM operators that their customers might use. IPX also handles all the interaction with the different operators and takes care of the revenue stream. The service provider does not have to know what operator their consumer might use, IPX takes care of that. This is one of the big advantages of using IPX.

6.2.4 SEB

We met with a strategic business developer at SEB in Stockholm to discuss their role in relation to retail electronic payments. As a North European financial banking group, SEB is naturally involved in the process of implementing new standards for electronic payments with a strong focus on different kinds of payment cards. In the presentation of SEB we will initially describe different standards for these types of payments.

Standards for electronic payment

In the early days of e-commerce consumers were afraid that card fraud would increase when card numbers were being sent over Internet. The network of banks and card issuing companies realized that and in order to support the development of e-commerce they started in 1996 to develop a standard for card payments over the Internet called Secure Electronic Transaction (SET).

Due to the necessity to install software on the consumer’s computer this method did never however become the success it was meant to be. The fact that the banks and card issuing companies developed SET and wanted the consumers to use it stated for the consumers that it was insecure to use the payment card without
extra security. When SET then turned out to be a failure, people continued to be reluctant to use their payment cards for electronic purchases.

In the wake of this defeat the card issuing companies Visa and MasterCard have developed a new model for secure electronic card payments which is meant to be more easy to use for the end consumer. The card issuers have their own individual names for this model but it is commonly talked about as 3-D Secure. Banks and card acquires are currently implementing 3-D Secure as the new standard for electronic card transactions.

If we are to look one step further ahead the card issuers are forced to replace the magnetic strip on the payment cards with an electronic chip. These cards are known as smart cards and the standard for putting the information that is needed for a card payment into the chip on a Eurocard, MasterCard or Visa is known as EMV.

**3-D Secure**

SEB has identified three main advantages for 3-D Secure in comparison with the earlier attempt SET. Firstly it is easy to use for the card holder, secondly it gives the merchant granted payments and thirdly it is broadly accepted by card issuers globally. In a few years time there will also be a shift in liability between the card holder’s bank and the merchant’s bank. This is referred to as a global liability shift which simplified can be explained as a change in the identification process where the card holder identifies himself to his bank or card issuer instead of to the merchant. This means that if the card holder’s identification is approved the merchant is guaranteed payment from the card issuer or the card holder’s bank.

The card associations name for 3-D Secure is *Verified by Visa* and *MasterCard Secure Code* respectively. Merchants that support this method of payment have special signs displayed for the customer.

SEB is using the card acquirer Euroline and they can currently provide granted payments for Visa and MasterCards issued in Europe.

We asked the person we interviewed at SEB what they thought of having a magnetic card reader in the box but he did not see any benefits in that. If you only have the magnetic card reader the security is the same if you swipe the card as if you enter the card number manually. However, if the consumer is able to enter the pin code associated with the card the security will be improved but the infrastructure will be far more expensive and complicated. It also adds an extra input for the consumer which should be avoided. He believes that the user friendliness is crucial for interactive payments and he also state that the customers want security but not at any price.
EMV
As previously stated, EMV can be described as the process of putting information needed for an electronic payment onto a chip. It also implies that all magnetic stripe card readers that are used by merchants today must be exchanged for new card readers that can read smart cards. This process is associated with a huge cost and the implementation will therefore take a long time. A rough estimate is that smart cards will be available to consumers within two to five years. The difference in security between a smart card and a card equipped with a magnetic stripe is that the smart card is more tamper proof, i.e. it is more difficult to retrieve information for fraud purposes from a smart card.

When the smart card technology is more developed and in use it would be possible to produce the STB with an installed smart card reader that could be used for secure card payments. For Ecton’s sake it is important to be up-to-date with the development of smart cards and continuously ask the card issuing companies of the time to implementation.

E-wallets
SEB does not have its own e-wallet solution. The basic principle of such a solution is a pre-paid account where the money is stored much like a pre-paid phone-card. The service provider can then charge the amount directly from that account without using a physical payment card.

SEB has not implemented its own e-wallet since there have been so many other players trying to implement and sell these kinds of solutions.

The interviewee suggests that a variant of an e-wallet is implemented in the STB. The user will enter his credit card information into the box the first time of usage and that information is stored and used on all subsequent purchases. This information can be stored either in the box or at a centralized location at the PSP.

According to him this would function as an e-wallet solution without the need of a pre-paid account. The advantage according to him is that this solution minimizes the input of credit card details and that it is simple to use for the consumer. It would also be relatively cheap for Ecton to implement.

Aggregated micro payments
If the services or products provided over the STB generally constitutes of small amounts, so called micro payments, SEB says it is not profitable to conduct one transaction at each time of purchase. A better way would be to aggregate the payments until a certain amount is reached and then contact the consumer and settle the payment.
7 Analysis

In this chapter we present the result from using our analysis models. The analysis covers both services in interactive TV and the different payment solutions.

7.1 SERVICES IN INTERACTIVE TV

In this section we will use the first analysis model to see which payment methods and price models that are needed for each type of service that can be of interest in iTV. First we need to identify which these services are and divide them into general groups so that we can use them together with our analysis model.

7.1.1 Services – our way to divide them

In the study we met with many different actors in the iTV industry and they gave many different views of all the services that would be possible with the addition of more functionality to the STB. We have however chosen to reduce the number of available services by categorizing them in a more structured way. As a basis for the structuring we use a combination of Browns (2001) overview of the interactive TV industry (see Figure 4-1) and O’Driscoll’s (2000) Digital STB computing paradigm (see Figure 4-2). Together they give an understanding of what type of services and service providers that exists in the interactive TV industry.

Interactive TV

For the basic services in iTV that makes the interactivity we have chosen to categorize them in the same category. This is mainly because they from a payment solution perspective are the same. The interactivity is obtained by making the consumer take part in the program in different ways like voting or answering questions in a competition. ITV-services are provided from what Brown (2001) categorizes in the first step of the New media value chain. All current TV broadcasters and their TV broadcasts are in this category. One example of a Swedish broadcaster is TV4.

Today the most common payment method is by using a reverse billing solution of some kind. This usually means small amounts and a payment method that is very easy to use for the consumer since there is a prearranged agreement that is used to make the payment. TV4 pointed out that today there is no standardized way to pay for iTV and therefore a payment directly to the TV-broadcaster via premium SMS or number is suitable.
On demand

The second category is on demand services. These are broadcasts that are sent to the consumer on demand. They can be both time-shifted programs like a movie (VoD) or documentary and live broadcasts like sport events or music concerts. SF Anytime is one example of a service provider whose services are placed in this category.

Characteristic for these services are that they are consumed once at the time of viewing and are therefore most suitable for a per unit price model. One alternative is a flat rate price model where the consumer pays for a weeks viewing or an entire sports event. One problem that SF Anytime pointed out is the rights issue of different movies and a no limit watching solution could be difficult to implement.

The payment method used is of less importance and today there are no methods that are used to a greater extent than the other.

Voice over IP - VoIP

One special category that applies to the STB from Ecton is VoIP. This is special since this is a service that is not directly related to the television or a STB. The VoIP-service is possible thanks to the broadband connection, the extra processing power and the Bluetooth-connection of the STB.

VoIP is a replacement for the regular phone which traditionally has been charged by the minute. Therefore the most suitable price model is Time. One alternative price model could be flat rate where the consumer pays a monthly fee and can make unlimited number of phone calls to certain numbers.

Reverse billing is the most common payment method used in the telecom line of business and therefore it would be appropriate to use it with a VoIP-service. As pointed out by TV4 a reverse billing has the advantage of making the payment invisible for the consumer.

Shopping

Through the STB it will be possible to order tangible products with the use of the remote control. The price of these products can be quite high and the product doesn’t necessarily have any connection to the STB. The price model for a tangible product should be the same as when ordering it over any other medium, therefore Per unit is the most suitable. The payment method should also be the same as when ordering the product elsewhere and there payment cards or some sort of e-wallet is mostly used.

One problem with shopping is that the price of a product can be substantially higher than that of an interactive service. Premium SMS and premium phone
numbers usually have a rather low limit on the amount that can be charged every
time and the operators also take a rather high fee for processing the payment. This
together makes Premium SMS and Premium number not as suitable as a payment
method. A reverse billing solution with an invoice or a solution where the
payment is sent directly to the seller is better.

Web services
This category contains all the services that are the same as provided through a web
browser on a regular computer. The only difference is that they are adapted to the
STB with regard of the input device (the remote control) and the screen size and
resolution of the TV. Examples of services that could be suitable are dating and
chat services as well as gaming and betting.

TV4 Interaktiv’s site blip.se is an example of a service that easily could be adopted
to be used on a TV-screen with the remote control since the games does not
require the use of a keyboard.

The price model depends very much on the type of service and all four of them
can be suitable. The same goes for the payment method.

7.1.2 Price models and payment methods required for interactive TV
With the above categorization of services the next step is to put those into the
Analysis matrix for services in interactive TV (see Figure 5-1). The resulting matrix is
presented below in Figure 7-1.

<table>
<thead>
<tr>
<th>Price Models</th>
<th>Per unit</th>
<th>Time</th>
<th>Data Volume</th>
<th>Flat rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Billing</td>
<td>iTV</td>
<td>VoIP</td>
<td>VoIP</td>
<td></td>
</tr>
<tr>
<td>Payment Cards</td>
<td>Shopping</td>
<td>On Demand</td>
<td>Web Services</td>
<td></td>
</tr>
<tr>
<td>e-wallet</td>
<td></td>
<td></td>
<td></td>
<td>VoIP</td>
</tr>
</tbody>
</table>

Figure 7-1 – Analysis matrix for services in interactive TV.

From the above matrix a number of conclusions can be made. The first
observation is that Data volume is not a price model that is widely used or
required for a payment solution for services in interactive TV. Apart from the
VoIP-service there is little need for a time-based price model. This leaves Per unit
and Flat rate as the two major price models used for the services provided by the
STB.
Among the payment methods it is harder to draw any direct conclusions. The different payment models are suitable for different services but the reverse billing with invoice is a good solution that suits many of the needs. One problem with reverse billing is however that for example betting in Sweden the amount is required to be paid in advance.

### 7.1.3 Analysis of the studied service providers

In this section we present our analysis regarding the service providers we met during our study. Some of them will have a stronger focus towards payment solutions rather than the service they provide, but that lies within the purpose of this thesis. For example, SF Anytime provides VoD content and we will give are thoughts on the payment solutions associated with their service, rather than analyzing the service in itself. The study of Ecton will not be analyzed individually since they are actually in focus of all the analysis. In the conclusion chapter we will summarize the implications of the analysis of the other industry actors with a focus on Ecton.

**SF Anytime**

In the theory chapter we outlined Turner’s (2001) description of a payment method called reverse billing. The basic concept of that method is to use an existing billing relation from a fixed or mobile phone line and use that billing relation for payment of various electronic services. This means that the telecom operator is functioning as a payment partner.

When we met with SF Anytime we got a description of their payment solution for VoD services and realized how similar it is to the one described by Turner (2001). There is however two major differences between the two. The report written by Turner (2001) is written with a strong mobile Internet focus and the reversed billing payment method is described only as a solution with a telecom operator as the payment partner. The reader is also told that a third party PSP is used for content distribution and payment settlement. In the SF Anytime case this is however only partly true. They are not using a telecom operator as a payment partner and the content is sent directly through Bredbandsbolaget and not through a third party.

From our point of view this expands the meaning of the concept reverse billing, if compared with Turner’s (2001) perspective. This payment method has now been adopted by actors in the interactive DTV industry where the content provider is using an ISP as a partner for both payment and distribution. We believe that the concept reverse billing should be associated with all payments where an already established billing relation is used for payments of digital services.
**Price models**

In the theoretical framework Turner (2001) suggests that flat rate price models might in some cases not be allowed due to legal issues. We understood that SF Anytime is experiencing the same kind of problems. They would be allowed to use flat rate price models but for movies it would be very difficult to manage due to rights ownership aspects. For TV channels it would on the other hand be preferable to use flat rates as a base of pricing. The implication of Turner’s (2001) suggestion is that legal issues can complicate the use of flat rate price models and in some cases even ban them, but it is totally dependent on the type of content.

As stated in the study of SF Anytime, they only use the per unit price model which can be seen as a contradiction to Turner’s (2001) suggestion that the per unit pricing model is “the traditional way of pricing physical products while the other pricing models are more common in today’s world of services and intangible products”. SF Anytime is indeed providing an intangible product and shows that the classic price model per unit also can be very efficient when it comes to digital media.

**Bredbandsbolaget**

In the pre study we made we found out that industry analysts, such as Brown (2001), believe that the ISPs are focusing more and more on content rather than access only services. The report we based that statement on was written a couple of years ago and from Bredbandsbolaget we got a confirmation on that this was the case at the time of writing, but the reality has changed. A couple of years ago Bredbandsbolaget also believed that content was the real cash cow but has now realized that the money right now is in access provision. We believe that one reason is that it is important to generate a large customer base before pushing out various different services and interactive content.

Today the Internet market is more mature and the consumers are using more and more premium content. Our belief is that when some of the focus is moved towards interactive TV the consumers are now accustomed to paying for content and are hence more susceptible for those types of products in the new media. This implies that the statement from Bredbandsbolaget that it would be desirable for a STB developer to cooperate with other actors in the industry, likely is true. People want to have some sort of content, besides the DTV channels, together with the box in order to see its full potentials.
**Payment solutions**

Regarding the reverse billing solution that we told about in the SF Anytime case, we did not get any new information from Bredbandsbolaget, other than that the provided information is correct.

The payment solution related to X-Box Live has in itself nothing to do with Bredbandsbolaget as a company but we were given the information as an example of alternative payment methods. That method can be described as an e-wallet with stored details. This means that the consumer does not need to enter new payment card details for each purchase, which we believe is very important from an easy-to-use perspective. It is also likely that this drives the usage of premium content.

**TV4**

As Turner (2001) suggests the use of reverse billing with both premium rate SMS and numbers makes it easy for the consumer to pay for the content and it could generate large revenues to the service provider. TV4 Interaktiv uses both these payment methods and has managed to create several successful services.

O’Mahony (1997) on the other hand says that for small payment amounts the use of payment cards is not profitable. This is confirmed by TV4 Interaktiv where the use of payment cards and direct payment is only possible when larger amounts are being paid.

One problem for TV4 Interaktiv is that some consumers are dissatisfied with the fact that the flat rate price model is in fact not always flat rate. Sometimes there is an extra charge for using a service to its full extent. This problem is confirmed by Turner (2001) that says it is hard to introduce new charging models for higher value services when the consumer has become accustomed to the flat rate pricing scheme.

### 7.2 PAYMENT SOLUTION FLEXIBILITY

In this section we use the analysis matrix to analyze the different payment solutions. Each payment solution is analyzed independently with one matrix for each solution. The resulting matrices are then used in the second step of the analysis.

#### 7.2.1 Wallit

The three main payment solutions provided by Wallit are the Wallit API, the invoice solution and the e-wallet solution Payex. In this section we will provide our analysis of these solutions and in the payment flexibility matrix we will incorporate the three under the name of Wallit.
Wallit API

In the study we stated that the solution provided by Wallit called Wallit API “offers the possibility to make both card payments and direct bank payments from various different electronic platforms”. The benefit we see in providing a direct bank payment method is that it takes advantage of the increased security that the specific bank offers in their online banking solution. The great disadvantage is however that every bank has their own e-banking solution which demands unique solutions to be developed for each bank.

Furthermore, the API solution provided by Wallit is similar to the payment card solution outlined by Wright (2002). In both solutions a PSP has a central role in routing the credit card information for authorization and Wright suggests that the credit card number can be sent in three different ways. One way is to send the credit card to the merchant who then passes it on to the PSP. This is exactly how it works in the Wallit API case.

A big difference between Wright’s model and the solution provided by Wallit is that Wright (2002) suggests that the PSP is only involved in the authorization process, but in Wallit’s case the PSP is also functioning as the merchant bank that routes the payments to the merchant and the content providers.

The fact that the price model intelligence has to be developed by the merchant is not a big problem since the amount of programming associated with that development is not very vast. You can in fact say that all different price models can be used together with Wallit API.

Invoice distribution

This is one more example on the discussion we had under SF Anytime regarding the fact that reverse billing has up until now been associated with SMS or premium rate payments in the telecom industry. Wallit can provide a solution where payments for content and services can be added to the monthly bill for the STB, which is basically the same type of payment method that SF Anytime uses together with the ISP Bredbandsbolaget. This strengthens our beliefs that this method is important to drive the use of interactive services when applied to the TV and that it should go under the name of reverse billing.

Payex

In the study we outlined the features of Payex and among them was the possibility to use electronic value codes. These value codes are very similar to the payment method that O’Driscoll (2000) calls electronic cash.
One major disadvantage with e-wallets such as Payex is as we see it that in order for it to be a widely used solution and some sort of a standard for electronic payment it has to be connected to a majority of the online merchants.

**General**

We see the cooperation and subsidiary relation with the payment outsourcing company Faktab Finans as important because it gives certain credibility to Wallit as a PSP partner. Wallit has the technical know-how and Faktab Finans has the long-time experience with payment outsourcing.

Wright (2002) talks about the advantages of using a PSP and mentions that the PSP usually have the hardware backup facilities in order to minimize the risk of breakdowns. Wallit has incorporated this in their infrastructure so that the client hopefully does not experience any breakdowns with the loss of customers as a result.

**Level of flexibility**

In figure 7-2 below, we have summarized the payment methods and price models that the solutions from Wallit support.

<table>
<thead>
<tr>
<th>Price Models</th>
<th>Per unit</th>
<th>Time</th>
<th>Data Volume</th>
<th>Flat rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Payment Methods</strong></td>
<td></td>
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<tr>
<td><strong>Reverse Billing</strong></td>
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<td>Invoice</td>
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<tr>
<td><strong>Payment Cards</strong></td>
<td>Wallit API</td>
<td>Payex</td>
<td></td>
<td>Wallit API</td>
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<tr>
<td><strong>e-wallet</strong></td>
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</table>

Figure 7-2 – Flexibility of Wallit's payment solution.

**Stage of development**

The solutions provided by Wallit are all available today and therefore we can say that the stage of development for Wallit’s products is high.

7.2.2 **Inap**

Inap is not a traditional payment provider but rather a service provider with specific services aimed at the telecom operators. Despite this fact there is a great deal that can be learnt from them in regard of a telecom operator since they have a tradition of getting paid for all the services they offer and also offer them in a straight forward easy to use way always available to the consumer. The main
contribution for our case is however the payment solution that the subsidiary Incapo offers.

Incapo’s payment solution OneWallet is very much like the idea that SEB presented with a device centric solution that stores information about the payment card and uses that with every purchase. The solution is a combination of a traditional payment card that O'Mahony (1997) presents and the PSP approach that Wright (2002) suggests. OneWallet could in fact be seen as a halfway step towards a PSP-solution. The problem that small amounts are too expensive to be profitable are still there though. The advantages on the other hand are that there is no need to implement and develop a costly proprietary solution for handling the payment card information and the four key advantages that Wright (2002) suggests, namely:

- The merchant does not need the costly procedure of being accepted as a payment processing entity by the banks and credit card companies.
- The PSP usually has IT backup facilities that automatically come into operation in the occasion of a unit breakdown.
- The merchants do not typically have enough server capacity to handle plenty of customers during peak hours.
- A regular web server used by a merchant does not usually have the required power to handle the cryptography and security issues associated with credit card transactions.

Level of flexibility

Below is the analysis matrix for payment solution flexibility for Incapo’s OneWallet.

<table>
<thead>
<tr>
<th>Price Models</th>
<th>Per unit</th>
<th>Time</th>
<th>Data Volume</th>
<th>Flat rate</th>
</tr>
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<tbody>
<tr>
<td>Payment Methods</td>
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<tr>
<td>Reverse Billing</td>
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<td>Payment Cards</td>
<td>Incapo OneWallet</td>
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<td>Incapo OneWallet</td>
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<td>e-wallet</td>
<td>Incapo OneWallet</td>
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</tbody>
</table>

Figure 7-3 – Flexibility of Incapo's OneWallet
OneWallet is in fact a payment card solution but the reason for the box being halfway into the e-wallet cell is that it shares some characteristics of O’Driscoll’s (2000) definition of electronic cash but not all of them. The main thing missing is the suitability for micro-payments.

**Stage of development**

OneWallet is not available on the market today and the solution can not be purchased or used today. Despite this it is a very interesting concept that combines the simplicity of a payment card with the addition of an electronic payment solution. The solution also makes it possible to implement authentication via the mobile phone, something Pohlmann (2002) suggests will play an important role in the next generation of payment solutions.

### 7.2.3  Ericsson IPX

The payment solution IPX from Ericsson is a real-world implementation of the model that Turner (2001) suggests as a favorable solution for content providers. The main advantage is that the content provider does not need to establish its own billing relation with the end consumer. IPX has also taken the reverse billing SMS service several steps further than Turner (2001) outlines by providing it to all digital content providers, not only providers of mobile content but also of Internet services.

The possibility of using IPX as an identification service through the mobile phone makes the solution according to Pohlmann (2002) something that could play an important role in the future. IPX has also implemented all the three steps of AAA-security by providing Authentication, Authorization and Accounting to the service providers.

**Level of flexibility**

Below is the analysis matrix for payment solution flexibility for Ericsson IPX.

<table>
<thead>
<tr>
<th>Price Models</th>
<th>Per unit</th>
<th>Time</th>
<th>Data Volume</th>
<th>Flat rate</th>
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<td>Reverse Billing</td>
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<td></td>
<td>Ericsson IPX</td>
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<tr>
<td>Payment Cards</td>
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<tr>
<td>e-wallet</td>
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</table>

Figure 7-4 – Flexibility of Ericsson IPX
The IPX-solution only offers payment via SMS. This is suitable for micro payments of intangible products but the disadvantage is as stated before the high margins of the telecom operators and the relatively low maximum amount per SMS. SMS also have a fixed price which makes the solution rather inflexible when it comes to different price models. It might be possible to implement a price model based on time or data volume because that is something that IPX doesn’t offer today.

**Stage of development**

The solution from IPX is something that is available today in most parts of Europe and Asia. Therefore its stage of development is considered fairly high.

**7.2.4 SEB**

One important result from the SEB study is the development of new standards for payment card information transfer. Wright (2002) suggests that one way to transfer the card information is by using SET, but according to SEB that system is hardly in use anymore. It never became widely used by the consumers and therefore not profitable for the banks to administrate.

The new security standards that have been developed by the card issuing companies Visa and MasterCard show that they are making an effort to make the consumers more comfortable in using their payment cards online. Naturally they should because an increase in usage means an increase in profits. The development of these new standards gives credibility to the statement from Wallit that the payment card online usage is likely to increase in the upcoming years. We have nothing that contradicts that statement and believe that after years of payment card usage people should get more and more accustomed to use them online as well.

When it comes to e-wallets the problem is that there are no standards for them so all service providers have to implement connections to all the different wallets that they would like to use. This would however not be a problem in the STB since all the services that are provided are controlled by Ecton in some sense through the dynamical GUI. This means that if Ecton is using one e-wallet in their STB they can guarantee the service providers that all consumers have access to the same e-wallet.

According to SEB the e-wallet solution is somewhat necessary when it comes to payment for interactive content and services because many of the payments that are made are rather small. It would not be profitable to use the payment card or a direct bank payment solution for each transaction. This strengthens the statement
by O’Mahony (1997) in the theoretical framework and it also gives an extra credibility to the result from the analysis of TV4 Interaktiv.

The e-wallet could be used to aggregate small payments and incorporate a system that activates the settlement when a certain level is reached. The consumer can then decide what type of payment he wants to use. Whether the consumer wants to use a payment card or a traditional invoice, it is important to calculate at which level the settlement should be activated. Since the different payment methods are associated with different costs the level is naturally different depending on which payment method the consumer decides to use.

### 7.3 PAYMENT SOLUTION SUITABILITY

As explained in chapter 5.3 – *Payment solution suitability* the second step in our analysis is to combine the matrices from above into our comparison chart.

The flexibility of a payment solution is obtained from how well the given payment solution covers the flexibility matrix while the stage of development is based on the availability of the given solution. And finally the suitability is obtained by comparing the service-matrix with the one from the given payment solution and see how well they coincide.

The resulting matrix is shown below.

Figure 7.5 – Comparison of iTV payment solutions.
As can be seen from the matrix above IPX and INAP have the same level of flexibility but IPX has a more developed solution. This is because they offer the same price models but the solution from IPX is available today while OneWallet isn’t.

Wallit is both the most flexible and the highest developed solution because of its many price and payment models. It also excels in the suitability for iTV payments mainly because of its high level of flexibility that covers all requirements for iTV.
8 Conclusions

Here we present our conclusion from the analysis and the answer to the initial questions. We also give a picture of what we think would be a good future payment solution.

8.1 BASIC OUTLINE OF THE CONCLUSIONS

In this chapter we will summarize the analysis with a focus on what implications it has for Ecton. It will also result in a conceptual model of a payment solution that would be suitable for them. The conclusions are divided between Services in interactive TV and Payment solutions.

These are some of the general conclusions that we believe are important:

- The price models flat rate and per unit are the two most important ones when it comes to services in interactive TV.

- The reverse billing payment method is the one that can be a key to success within this field.

- In some cases one payment method can be favorable to another and it is all about which type of content or service that is to be paid for. This means that it is difficult to say that THIS solution is the best because different content providers have different preferences regarding payment.

- If the implementation of a payment solution is to be made today there is no generic solution available and therefore a proprietary solution needs to be developed or bought.

- In the best of worlds ONE solution should exist for all electronic payments. This will however take some time (if it ever will be realized) but we think that the card issuing companies will have much to say in this matter.

- If Ecton will provide services through their box one suitable solution would be a solution that keeps track of the customer’s content usage and adds the amount to the monthly bill for the box. If they do not want to administrate this by themselves a PSP should be used.

8.2 SERVICES IN INTERACTIVE TV

The services provided in iTV are only just beginning to be explored. Many services will never reach the critical mass needed to be successful while some will become as natural to use as just watching TV is today.
One question that arose during many of our interviews is whether or not consumers want as much interactivity as the STB could provide. It will take time before everyone is used to take an active part in the TV-shows, if they ever will. Watching TV is a recreational hobby and some believe that it will stay that way.

We do however strongly believe that the STB as a home entertainment center will become a natural device in the future homes. New services not directly related to watching TV will evolve and reach out to the broader masses through the use of a STB.

8.3 PAYMENT SOLUTIONS

As stated earlier there is no generic payment solution available today that works everywhere and therefore Ecton will have to choose a proprietary one available on the market or develop one on their own. We believe that Ecton should use a PSP and the benefits they provide, which is also something that Wright (2002) suggests is desirable.

If Ecton will provide and enable services through their box with service providers connected to them one suitable solution would be one that keeps track of the customer’s service usage and adds the amount to the monthly bill for the box. This is a solution that is easy to use for the consumer while also avoiding the transaction cost normally attached to micro payments since the payments are aggregated on a monthly basis. This modified reverse billing method also make the payment “invisible” to the end consumer since they don’t have to provide billing information with every purchase.

Of the Swedish companies we have studied Wallit is the partner most suitable to provide such a solution to Ecton. Wallit has the general knowledge of invoice handling together with Faktab Finans and also the specific knowledge required in the field of electronic payments.

8.4 FUTURE RESEARCH

Some subjects relevant to payment solutions have not been thoroughly discussed and analyzed in this thesis but are nevertheless important to consider and perhaps make future research about.

Value chain perspective and revenue sharing

The interaction between the different market players is crucial both to the development of the industry and to reach public acceptance. This makes the value chain perspective itself very interesting to conduct a further study about.
With the value chain perspective comes the handling of the cash flow. The iTV-services could generate a substantial amount of cash flow with a wider acceptance and this will make the question of revenue sharing and handling of the cash flow more important. All actors in the value chain want a piece of the pie and there are also large financial institutions that are interested in handling the cash flow itself.

**Consumer perspective**

When developing new technologies and changing the way consumers are used to utilize services it is important not to forget the consumer himself. There have been suggestions that the TV wants to stay a one way communication where the consumers are supplied with services without the possibility to choose more than between different channels. Will it stay this way?

One other important factor is the fact that a TV-program could be viewed by many while some of the services might be best suited for one person, mostly shopping and web services. Will the computer and TV-set still be two separate units or will we use the TV in the future as we use the computer today? This would require several STBs in the future home.

Both these factors are important to consider both when developing and selling the next generation STBs.
References

9 References

9.1 LITERATURE AND INTERNET RESOURCES


Wright David, *Comparative evaluation of electronic payment systems*, INFOR Feb2002, Vol. 40 Issue 1


### 9.2 INTERVIEWS


Backentoft Patrik, Business Planner, Incapo AB, 2003-12-08

Hammarstedt Jakob, Business Strategist, SF Anytime AB, 2003-12-05

Hellberg Camilla, Sales Assistant, Wallit AB, 2003-12-03

Isakson Björn, Product development manager, Bredbandsbolaget AB, 2004-01-20

Lidbom Charles, Sales/Project Manager, Wallit AB, 2003-12-03

Lindström Mats, VD, Inap AB, 2003-12-08

Rizvi Jan, Technical Manager, TV4 Interaktiv AB, 2003-12-19

Ruben Fredrik, Regional Sales Manager Nordic and Baltic countries, Ericsson AB – IPX, 2003-12-15

### 9.3 OTHER


10 Appendices

10.1 APPENDIX A – EXPLANATIONS AND ABBREVIATIONS

**API – Application Programming Interface**
A predefined interface with programming functions that a programmer can use to access specific features in another program.

**Bluetooth – Wireless technology**
Bluetooth is a wireless technology used to communicate between two devices over a short distance. Primarily used in mobile phones, PDA’s and computers.

**CA – Conditional Access**
A technology used to control access to DTV broadcasts and services strictly to authorized users by encrypting the transmitted program.

**DTV – Digital Television**
Television broadcast that is transferred digital instead of the traditional analogue broadcast.

**DVB – Digital Video Broadcasting**
Standard for broadcasting Digital Television.

**DVD – Digital Versatile Disk**
DVD is a high capacity multimedia data storage medium. It can accommodate a complete movie on a single disc, content rich multimedia or very high quality multi-channel audio.

**EPG – Electronic Program Guide**
Program guide shown through the Set Top Box on the TV that contains information about all available channels and programs.

**EMV – Eurocard, Mastercard, Visa**
EMV is a standard for storing payment card information on a small chip instead of on the magnetic strip of a payment card.

**GSM – Mobile phone standard**
GSM is a mobile phone standard used all over the world.
GUI – Graphical User Interface
The graphical interface that is used today on computers, TV-sets and VCR’s.

ISP – Internet Service Provider
Provides Internet connections to consumers and/or companies. Also provider of add-on services related to the Internet.

iTV – Interactive Television
Interactive television broadcast were the viewer can interact with the program using the remote control.

IVR – Interactive Voice Response
Interactive service used with a traditional phone. The service is controlled by using the dial-buttons on the phone.

MMS – Multimedia Messaging Service
Messaging service like SMS but the message can contain images and sound.

MP3 – Audio format
MP3 is a digital audio format used to store music in a file on a computer.

PDA – Personal Digital Assistant
A palm sized handheld computer that is mostly used for time management, i.e. calendar purposes.

PSP – Payment Service Provider
A payment service provider offers payment services to other companies that don’t want to handle the payment process themselves.

Return channel
The connection that iTV uses to achieve the interactive functionality, could be a phone or broadband connection.

SET – Secure Electronic Transaction
A standard for electronic card payments developed by a network of banks, card issuing companies and computer companies.

SMS / Premium SMS – Short Messaging service
Small text messages send via a mobile phone. Premium SMS is an SMS that costs more and can therefore be used to make payments.

STB – Set top box
A box that receives a digital television broadcast and transforms it into an analogue signal that a regular TV can show. It usually has its own menu-driven interface that is controlled via remote control or wireless keyboard.

**VCR – Video Cassette Recorder**

Video cassette recorder, the most common type in Europe is VHS.

**VoD – Video on Demand**

Video on demand is a movie or any other program sent directly to the customer when he wants it.

**VoIP – Voice over IP**

A technique to make regular phone calls over the Internet.

**WAP – Wireless application protocol**

A mobile standard for making web content available on the smaller screen of a mobile phone. The browser in the phone is called a WAP-browser.
10.2 APPENDIX B – INTERVIEW GUIDE

The key words below have been the basis for all of our interviews. Since we have interviewed various different types of industry actors the specific interview questions derived from these words for each actor have naturally not been the same.

Other key words and examples of questions

Security – What is important when it comes to the system security of a payment solution for this type of purpose?

Other industry actors – What is your relation to other industry actors such as……?

Present – How is your line of business going today, what is the market demand? What services/payment solutions are in focus?

Future – What is important to make the industry flourish in the future? Future standards of payment?

User friendliness – What is your view on user friendliness in payment solutions?
Interview outline

The very first thing we did during the interviews was to present the company Ecton, ourselves and the purpose of this thesis.

The questions derived from the key words above have had an open-ended style. In order for us to know what type of relationship the studied actor has to a company like Ecton all interviews have in general started with a discussion of the studied actor’s role in the interactive TV value chain. The focus has been on what the actors thought about the payment stream and how the payment problem should be solved. Furthermore actor specific questions have been e-mailed in advance and discussed during the interview session.