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Development of Digital TV in Europe

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1 Digital TV market overview

1.1 Roll-out of digital services

1.1.1 Satellite digital services

Sweden has about 700.000 DTH households (18,3% of TV households). Out of these 71% subscribe to one or more satellite services. On the Swedish digital satellite TV market, the only service provider is Canal Digital.

During the summer of 1998 Canal Digital started a new digital service in all Nordic counties consisting of premium and basic pay-TV packages, as well as a free package carrying among others the national public service TV channels. The subscription to the services was, however, first possible in late autumn 1998. Canal Digital's services include among others: national public service (SVT1, SVT2 and SVT24), commercial services (e.g. Swedish Kanal5) and premium pay-TV services (e.g. Canal+).

The penetration of digital TV is still modest, and there were only 25.000 subscribers to Canal Digital's digital services in August 1999. Apparently, however, the potentials in the market are big as a survey commissioned by Canal Digital Sweden in January 1999 shows that 28% of Swedish households consider getting a digital Set Top Box.

VIASAT, the other satellite TV service provider, remains analogue and has no official plans for digitalisation of its services.

1.1.2 Cable digital services

2,6 million Swedish households (68% of Swedish TV households) are passed by a cable system. Half of the cable TV households (1,3 million) are served by Telia Infomedia TeleVision, the major cable TV operator.

Telia started digitalisation of its cable networks in 1997, and by the end of the year there were 690.000 digital cable TV households (home passed). This number has increased to 1,1 million households in 1998. Therefore, by the end of 1998 42% of the TV households passed by cable could potentially subscribe to a digital TV multi-channel offer.

One of the other major cable operators, Stjärn TV with 240.000 subscribers, planned to start digitalisation of its network in 1998, but has not begun this process yet. However, they have announced starting during 1999. Stjärn TV has announced that they will use the Viaccess CA system (Access manager from CONNOVA, a version of Viaccess).

Two other major cable operators, KableVision with 350.000 subscribers (summer 1999) and Sweden On Line with 184.000 subscribers (summer 1999), have no official digitalisation plans.

Interest in digital TV has not been as high as expected. The subscribers to digital TV services at the end of 1998 were about 26.000 against an expected number of 100.000. The number of subscribers at the end of July 1999 was 30.000. There are different reasons for this lack of interest, among others:

- ✓ The vast majority of Swedish people prefer national programming which is already available in analogue packages.
- ✔ Telia does not offer any rental services for digital boxes. The current price for a box, 6000 SEK (633 Euro) can be considered as a barrier[1].
- ✔ Lack of new innovative digital services.

All the four major cable operators, mentioned above, provide Internet access services[2].

1.1.3 Situation of MMDS

MMDS is non- existent in Sweden.

1.1.4 Situation of XDSL

XDSL is still in a pilot phase in Sweden and according to Telia, commercial provision of the service will start in the beginning of year 2000.

1.1.5 Situation for terrestrial digital television

Terrestrial digital TV was introduced in Sweden in April 1999 with the coverage of 50% of the population. According to Boxer TV Access AB (see below for more information on Boxer TV Access AB) there were about 2.500 subscribers at the end of December 1999. The number is far less than initial estimations; consequently, at the end of 1999 some actors have expressed their scepticisms about the future of digital terrestrial TV.

One of the reasons for the lack of interest has been the absence of the popular commercial TV channels like TV3 in the terrestrial network. Swedish authorities have tried to force the media company MTG, the parent company of TV3, to start digital broadcasts in January 2000. To do this MTG demands to be allowed commercial breaks in programmes. The demand goes against a central principle of the Swedish Radio- and TV-legislation, which has only allowed commercials in blocks around programmes. "We assume that the Government will change the legislation to allow commercial breaks within a two year period,"[3]

[1] A consumer electronic retailer has recently started a rental service. For more information please see the section about “details of DTV offers” later in the report.

[2] For more information please refer to the section about “number and type of services” later in the report.

[3] MTG-head Peter Ramel to the Swedish industry newspaper Vision

Other actors have also required change of the advertising legislation and the government has declared that it will give the issue high priority and will make the necessary changes. Based essentially on this, main actors in Swedish digital TV predict higher penetration in year 2000. Senda, in a conservative prediction, estimates that at the end of year 2000 there will be 120.000 subscribers to the service.

Teracom, Senda and The Radio and TV Authority

In the fall of 1997, the Swedish Parliament, Riksdagen, established the legal basis for the launch of digital terrestrial transmission of television.

The construction and operation of the digital terrestrial broadcasting network was undertaken by Teracom, which is owned by the Swedish State. Furthermore Teracom acts as the multiplex operator for the current digital terrestrial TV network. Teracom also owns and operates the analogue radio/TV network.

To cater for the potential more complex situation around digital television a new company Senda AB (Senda) was established to be in charge of the co-ordination, administration and marketing of the various channels and services of the network as well as administration of Conditional Access and EPG. Senda is presently owned by Teracom AB (Teracom) and SVT (each owning 50%).

In June 1998, TV 4 AB – one of the commercial broadcasters - acquired a 1/3 share in Senda. But this came to an end in December 1998 as it led to considerable discontent among other market participants who felt that TV4 would gain a strategic/competitive advantage. TV4 therefore sold back the stock to the two original owners. The original stock value was approximately 20 Mio SEK (2,1 million Euro).

The first regular transmissions on the network started on April 1st 1999 and covered 50% of the population, in the five most densely populated areas. It is the intention that extensions of the network will be made in different steps according to decisions taken by the Riksdag. Currently, the plan is to offer 20 TV channels within 5 years.

Like in analogue terrestrial broadcasting, a licence from the Government is required to broadcast in the digital network, although transmission via cable networks or satellite does not require such a licence. The administration of this licensing is placed with the Radio and TV Authority, which is also the supervisory authority in the media area. This Authority keeps a register of everyone making transmissions under the Radio and TV Act[4].

An ad hoc parliamentary committee (the so-called Digital-TV-Committee) will follow the development and should deliver a report to the Government in 2002. This report will be the basis for further planning and development of digital terrestrial distribution.

The simulcast-period is foreseen to be about 10 years.

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[4] The Radio and TV authority, “Radio- och TV- verket”, only regulate a service if it can be identified as a broadcasting service. If the digital service provided does not fall within broadcasting, the regulatory framework for the service is found in the Telecommunications Act. This means that the National Post and Telecom Agency is the regulatory authority for all digital services not defined as broadcasting..

DTTV and content providers

The DTTV network in Sweden is implemented in 5 geographical areas:

- Stockholm, Mälerdalen and Uppsala.
- North Östergötland.
- South and north Skåne.
- Göteborg.
- Sundsvall and Östersund.

In the fall of 1997, interested parties were invited to apply for licences. The following table shows the regional and nationwide licences that have been granted. The numbers in the parentheses indicate which region the services belong to.

	National Licences granted		*Regional Licences granted*	
	Utilized	*Not yet utilized*	*Utilized*	*Not yet utilized*
MUX A	SVT1 (& UR), SVT2, SVT24		SVT Mälarkanalen (**I**), SVT Östnyt 24 (**II**), SVT Syd (**III**), SVT Väst (**IV**), SVT Mitt (**V**),	
MUX B		TV4, Cell Digital TV, Kunskaps-TV	NollEttaren (TV-Linköping Länkomedia) (**II**), Skånekanalen (Landskrona Vision AB) (**III**)	TV4 Stockholm (**I**), TV4 Göteborg (**IV**), TV4 Sundsvall (**V**)
MUX C	TV8, Canal+	TV3, Kanal 5		

As the table shows, so far the DTTV network consists of three Multiplex blocks. When all services are in function, 12 TV services will be available in every region. In the table the Multiplexes are - arbitrarily - named, MUX A, MUX B and MUX C.

MUX A contains the public service (SVT) channels. Three of services are “nationwide” and are available in all regions. Every region has, in addition to this, one regional SVT channel.

MUX B consists of commercial services. Three “nationwide” services are available in all regions and in every region an additional regional service is available.

MUX C is purely commercial and all four services are “nationwide” and available in all regions. No regional services are allocated in MUX C.

“Radio- och TV-verket” opened a round of new applications in July 5th 1999. This application round is for a new Multiplex block, i.e., four TV services. At least three of the TV services in the new Multiplex block will be “nationwide”, i.e., available in all five regions, while the fourth TV service can be used for regional services. The deadline for applications is September 15th 1999.

Senda administrates the Conditional Access (CA) System. All services in the terrestrial digital TV network are encrypted by the same CA system. The reasons for encryption of former free TV services, e.g., public service TV are primarily copyright issues. As reported below, Swedish citizens are able to obtain a decryption card for accessing, e.g., public service TV very cheap. The pay TV services are encrypted by the same Conditional Access system and separate subscription is necessary to access these services

Financing of Senda

As mentioned in the above, Senda's role is to introduce the digital terrestrial transmission by administering the conditional access (CA) system and the Electronic Programme Guide (EPG). When a company is granted a licence, that company and Senda must sign a contract, which determines the responsibilities and rights of the two parties specially in relation to access control and the EPG.

The activities of Senda is expected to be financed by charging customers for the programme CA card together with an annual subscription fee. The annual fee – which covers the basic package - is fixed at 295 SEK (31 Euro) and, e.g., the premium pay-TV channel Canal+ has a monthly cost of about 200 SEK (21 Euro).

Analysis of the organization of DTTV broadcasting

The centralised model, where the access system and multiplexing of the terrestrial digital TV is administrated centrally has aspects that may be seen as positive or negative by the different actors. The major actors in digital TV in Sweden are 1) The demand side (TV households), 2) The supply side (content, service, infrastructure and equipment providers), and finally 3) The government, traditionally having a vital role in the Swedish mass communication.

Seen from a demand side perspective, there are positive aspects in having a single organisation like SENDA. It is easier for the end-user to deal with one system because it provides a uniform interface with one CA system, one API and one service provider. Having Teracom as the only multiplex operator, on the other hand, reduces competition on supply side resulting in less variety in the services that the end-user can receive. The result will be less variety in services and difficult conditions for entrance of newcomers. On the other hand, the privileged conditions for public service broadcasters give them the opportunity to continue their public service obligation and serve the Swedish culture and language, etc. Furthermore, the limited spectrum/capacity of DTTV means that architecture of the market is decided by regulation and licensing. There is no easy market entry or exit.

The Swedish government is (and wants to remain) a major actor in the Swedish mass communication market. Traditionally, Sweden has had one of the most protective environments in Europe for the national public service broadcasting and was the last European country to permit commercial broadcasting. Terrestrial digital TV is attractive for the government, because the distribution service is located within the country and can be regulated by the government. Having only one organization for DTTV will make government control and regulation of the medium easier.

1.1.6 Market development

Sweden is the only Nordic country, where digital TV is available in all three distribution forms, satellite, cable and terrestrial network. It is also the only Nordic country, where a premium pay-TV service (Canal+) is distributed by a terrestrial network. As depicted in the following table, the total number of subscribers to digital services is about 58.000. The numbers indicated for Canal Digital and Senda include free-to-air viewers (there is no information available on the number of these).

Name of the service	*Ownership*	*Date of launch*	*Nb of subscribers (End of July 1999)*
Telia Infomedia Television	Telia	Spring 1997	30.000
Canal Digital	Canal+ & Telenor	Autumn 1998	25.000
Senda	SVT & Teracom	April 1999	2.500 (end of December 1999)

The weight of the digital TV market in the total Swedish TV market is negligible. This situation is, however, likely to change during 1999, due to the introduction of terrestrial digital TV in Sweden.

One of the interesting issues in the development of digital TV in Sweden is to identify whether the terrestrial infrastructure mainly will be *competing* or mainly *complementary* to satellite and cable. Will the current number of services and the availability of premium pay TV services in the terrestrial network make the satellite/cable subscribers change to terrestrial services? Or will terrestrial digital services continue to serve only the 35% of the population who does not already subscribe to satellite or cable services? The fact is that the number and variety of services in digital terrestrial network makes it a viable competitor to satellite and cable networks under the assumption that the Swedes will continue to prefer national programmes. Otherwise the high capacity available in the cable and satellite networks gives them a competitive advantage. The number of services apart, the potential portability and mobility give the terrestrial network a competitive advantage to, e.g., cable and satellite. Mobile reception is, however, not considered in the first phase but it may be included in the future.

1.1.7 Barriers to competition or market development

The high price of digital set top boxes, the high cost of upgrading the cable networks to enter the digital era and the lack of new digital services can be identified as some of the important economic barriers for the development of digital TV in Sweden. However, there are many reasons to believe that this will change due to a combined technical and economic development. The prices will fall due to mass production and in the competitive converging markets of mass communication, telecommunications and computing, where all distribution forms are digital, new innovative services will be developed.

Liberalisation of the advertising legislation is another parameter that will have heavy impact on the market development. As mentioned earlier this has been a main condition for MTG to start its digital service provision in the terrestrial network.

Furthermore, two copyright issues can be identified as potential barriers in terms of overspill. One is related to satellite distribution: The Swedish public service SVT has made an agreement with Canal Digital to have its services distributed in Canal Digital's digital satellite service. The service is encrypted, but free in Sweden. It can, however, be received in the other Nordic countries and may be viewed using free Swedish programme cards (Swedes can, e.g., obtain a free card and may send it to their relatives etc. in other Nordic countries or a grey card market may develop).

The other issue is related to terrestrial distribution: The programmes can technically be received in Denmark (in the Copenhagen area). The programmes are encrypted and the decryption card must be bought in Sweden and are only sold to people located in Sweden, but if the services are attractive to Danes, channels for commercial and non-commercial transfer are likely to develop. The later can primarily be a concern regarding free-to-air TV because the programme card can be obtained very cheap[5] in Sweden.

[5] The programme card for free-to-air TV is very cheap because the free-to-air services are financed in other ways, e.g., as public service TV financed by the licence fee.

1.2 Details of services

1.2.1 Number and type of services

In the following table the digital services available in Sweden are listed.

Service Type	*Services by Senda (Terrestrial)*	*Services by CD (Satellite)*	*Services by Telia (Cable)*
Swedish Public Service	SVT1, SVT2, SVT (regional), & SVT24	SVT1, SVT2 & SVT24	SVT1, SVT2 & SVT24
Swedish commercial services	TV8	Kanal 5,	TV3, TV4, Kanal 5, Tv6, TV8, ZTV, & ViaSat Sport
Foreign commercial services	-	TV Norge, TV Danmark, Adult Channel, Animal Planet, BBC Prime, Cartoon Network, CNBC, CNN International, Discovery Channel, Eurosport, Fox Kids, M2, MTV, Nickelodeon, Sky News, TCC Nordic, TNT Classic, Travel, VH-1	MTV, Eurosport International, Animal Planet, BBC Prime, BBC World, Bloomberg Television, Cartoon Network, CNBC, CNN, Foxkids, M2, Muzzik, National Geographic Channel, Nickelodeon, Sky News, TNT Classic Movies, Travel, VH-1, Discovery Channel
Foreign premium pay TV	Canal+	Canal+, Canal+ GUL, Erotica	Canal+, Canal+ GUL, TV 1000 & Cinema
Foreign language	-	NRK international, TV Finland,	
Foreign Public Service		DR1, DR2	NRK 1, DR1, FTV,
Interactive	-	Kiosk (22 NVOD channels)	Bio Hemma (6 pay per view channels), TV guiden (EPG) & Game (6 computer games)
Others	SVT's 5 regional services, NollEttan (regional) & Skånekanalen (regional)	20 digital music channels	40 digital music channels & 6 radio channels

Several of the services indicated in the table are also available in analogue form, but digital TV has influenced the media landscape as described in the following[6].

[6] Real free to air services are not available on the Swedish digital TV market. All services are encrypted, but decryption card for some services, e.g. public service TV, can be obtained at very low price or free.

Public service. The public service channels SVT1 and SVT2 are available in digital form in all distribution forms. And SVT24 is *only* available in digital form. Furthermore Public service programming from Denmark and Norway and Finland can be received in digital form

Regional TV. The TV service, NollEttan by Senda, will be a new and only digital service. All other regional channels are also available in analogue form, but according to Senda the digital services are slightly different from the analogue ones, where some of the new possibilities in digital production and distribution are used to add value to services.

Commercial TV. TV3, Kanal5, TV8 and Canal+ are only available in the *terrestrial network* as digital service.

Innovative services. As it is shown in the table a variety of new services has been offered in digital form:

- ✓ 6 pay per view channels in Telia's cable TV and 22 NVOD channels in Canal Digital's satellite service
- ✓ 20-40 music channels,
- ✓ 6 radio channels,
- ✓ Electronic Programme Guide,
- ✓ Simple computer games,
- ✓ Cell Digital TV from Senda will be a new, only digital and interactive service.

As a new service, Canal Digital provides "Formula 1 race from 7 camera angles", where seven different NVOD channels are dedicated to coverage of the race from different angles.

Furthermore a number of cable and satellite operators provide Internet access, outlined briefly in the following.

Internet via Cable TV

- ✓ Internet access via Telia's Cable TV: In first phase, the service is available to 785 000 of Telia Cable TV's 1.3 million households, primarily in big cities. In the areas where the service is provided the network is bi-directional (duplex) and the return path is implemented inside the network. The users pay a monthly subscription fee for unlimited use of the service. Telia does not have any rental service for cable modem. The prices for the service are as follows :

Network card	295 SEK (31 Euro)
Subscription (a cable TV subscription is a precondition)	395 SEK (41 Euro), per month
Modem	1995 SEK (210 Euro)

- ✓ **Internet access via Stjärn TV's Cable TV:** The service is available in the Stockholm area and during 1999 will expand to the whole network. Stjärn TV does not have any cable modem rental service. The users pay a monthly fee for unlimited use of the service (no per-minute fee). In the areas where the service is provided the network is duplex and the telephone network is not needed as a return path. The pricing of the service is outlined in the following table.

Start cost, including the network card	995 SEK (105 Euro)
Subscription	365 SEK (38 Euro), per month
Subscription payable by existing cable TV subscribers	279 SEK (29 Euro), per month
Modem	2995 SEK (316 Euro)

- ✓ **Internet access via Sweden On Line's Cable TV:** Sweden On Line provides Internet access in its entire network and all of the network is duplex. Sweden On Line does not offer any modem rental service, the starting up cost is 400-800 SEK (42-84 Euro) and the users must pay a monthly subscription fee of 300 SEK (32 Euro) for unlimited use of the service.

- ✓ **Internet access via Kabelvision's Cable TV:** Kabelvision provides Internet service in co-operation with Tele2[7]. Two different services are provided, depending on the network's capability of one or two way transmission. "Connect2Internet one way"[8] requires, in addition to a cable modem, a regular telephone modem for return path. "Connect2Internet two way" uses only a cable modem and the return path is within the network. The tariff of the "Connect2Internet one way" service is outlined in the following table.

Connect2Internet one way

Start cost	250 SEK (26 Euro)
Subscription	195 SEK (21 Euro), per month
Per-minute fee	Double local phone fee: 0.4 SEK (0.04 Euro) for daytime and 0.2 SEK (0.02 Euro) for evening/night-time.
Modem & network card	1995 SEK (210 Euro)

Connect2Internet Two way

Start cost	500 SEK (53 Euro)
Subscription	310 SEK (33 Euro), per month
Per-minute fee	No fee and unlimited use
Modem & network card	85 SEK (9 Euro), per month

[7] Kabelvision and Tele2 both belong to the Swedish Netcom AB group.

[8] Tele2 provides this service also in the satellite market.

1.2.2 Details of the DTV offers

Canal Digital

Canal Digital's services are outlined in the following table, where the prices indicated apply from August 1999.

Name of the service	*Short description*	*Price (August 1999)*
Canal Local	The public service channels SVT1, SVT2, SVT24 and Kanal5	Free
Canal Entertain	A mixture of different programmes from Cartoon Network to Adult Channel	129 SEK (14 Euro)
Canal+	Canal+ and Canal+ GUL	198 SEK (21 Euro)
Canal+ & Canal Entertain	-	299 SEK (32 Euro)
Canal Select TV Finland	The Finnish international satellite channel	75 SEK (8 Euro)
Canal Select DR1 & DR2	The Danish public service broadcasting channels	140 SEK (15 Euro)
Canal Select NRK international	The Norwegian international public service broadcasting channels	140 SEK (15 Euro)
Canal Select Erotica	Adult programming	69 SEK (7 Euro)
Kiosk	NVOD	49 SEK (5 Euro) per film.
Kiosk	"Formula 1 from 7 different angles"	59 SEK (6 Euro) per show and 690 SEK (73 Euro) for the whole session.

Subscription to any of these Canal Digital services involves additionally a start up cost of 395 SEK (42 Euro) plus 69 SEK (7 Euro) per month for rental of a set-top-box.

Telia Infomedia Television

The services in Telia cable TV can either be bought separately or in different packages.

Calculating the price of watching digital TV on Telia's cable TV is not so straightforward. Examples of some prices for acquiring a set top box etc. are outlined below[9]:

- ✓ The price of a set top box is 6.000 SEK (633 Euro) both for MACAB DBC-101 and Nokia Mediamaster 9730C.
- ✓ The price of the box (MACAB) is 2995 SEK (316 Euro) if one subscribes to the extended package[10] in minimum one year.
- ✓ The price of the box (MACAB) is 1995 SEK (210 Euro) if one subscribes to the extended package in minimum two years.
- ✓ The price of the box (MACAB) is 1495 SEK (158 Euro) if one subscribes to the extended package in minimum three years.

[9] It is important to note that the provider subsidizes the set-top-boxes. This is a unique case in the Nordic countries

[10] An extended package (containing 22 services) costs 179 SEK (19 Euro) per month

- ✓ Telia has no rental service. The customers must buy the set top boxes. However, one consumer electronics retailer, (THORN) has a rental offer of 99 SEK (10 Euro) per month. The precondition is subscription to Canal+ for a minimum of 12 months.

Apart from the box, a programme card at 249 SEK (26 Euro) for first year, and 198 SEK (21 Euro) per year for additional years is required. The programme card gives access to one TV service (SVT24), music service, games and EPG.

The services can also be bought separately at prices ranging from 29 (3 Euro) to 49 SEK (5 Euro). Furthermore the two premium pay-TV packages TV1000/TV1000 Cinema and Canal+/Canal+Gul cost 199 (21 Euro) per month

Senda

In the following the services that have a licence for digital TV broadcasting in the Swedish terrestrial digital TV network are described briefly:

- ✓ **Knowledge network (Kunskaps-TV):** A newly established company which is going to broadcast educational programmes.
- ✓ **Cell digital TV:** A company supplying interactive services.
- ✓ **SVT 1, SVT 2, SVT24, SVT Syd, Väst, Mitt, SVT Mälarkanalen and SVT Östnyt 24:** These channels are all part of Swedish Television AB. Until 2001 the digital activities will be financed from a specially assigned part of the obligatory television licence. Decisions for the future development will be made at a later date. Obligatory licence fees, paid by everybody owning a TV set, finance the channels.
- ✓ **UR:** Part of SVT. Supplies educational programmes.
- ✓ **TV8:** Commercial, advertising channel. Started broadcasting in autumn 1997.
- ✓ **Canal+:** The Nordic part of the pay-TV-channel Canal+. The headquarter is located in Stockholm where five channels customised for the Nordic countries are produced and distributed – there are four national services and one common for Denmark, Norway, Finland and Sweden.
- ✓ **TV3:** The channel is currently transmitted from the UK and distributed via cable and satellite. It is financed through advertising. It is owned by MTG, a big media conglomerate. It has affiliates in Norway, Finland, Denmark and the Baltic area.
- ✓ **TV4:** The channel has since 1996 been licensed for national broadcasting via the analogue terrestrial network as the only channel outside SVT. It is financed through advertising, and it pays a licence fee in proportion to its advertising revenue. In 1998 it paid approximately 10 Million Euro.

- ✓ **Kanal 5:** A Swedish channel financed by advertising. Presently, the channel is distributed by cable and satellite. The channel was established in 1989 and is owned by Scandinavian Broadcasting System, SBS. SBS has interests in TV channels in other Nordic countries (Norway and Denmark), in Belgium and in Holland.
- ✓ **NollEttaren:** Local station (Landskrona)
- ✓ **Skånekanalen:** Channel targeting regional interests in southern Sweden.

In the following table the pricing of services by Senda is outlined.

Pricing by Senda			
Service	**Free* (0 SEK)**	**349 SEK (37 Euro) Per year**	**198 SEK (21 Euro) Per month**
SVT1	X		
SVT2	X		
UR	X		
SVT24	X		
TV3		X	
TV4			
Kanal5		X	
Canal+			X
Kunskaps TV	X		
Cell Digital TV[11]	X		
SVT Mälarkanalen, SVT Östnyt 24, SVT Syd, SVT Väst, SVT Mitt	X		
TV4 Stockholm, TV4 Göteborg , TV4 Sundsvall	X		
Skånekanalen	X		
NollEttaren[12]	X		

* NB Senda requires for <u>all services</u> a fee of 295 SEK (31 Euro) annually in addition to the prices in the table.

Boxer TV Access AB

In October 1999 Boxer TV Access AB started offering terrestrial digital boxes on a rental basis, following poor sales. Boxer is owned by Teracom and Centrum NTR (a private company specialising in e-commerce and interactive services in digital television). Currently two different services are offered:

- ✓ Rental of box plus programme card for the basic package (All available services except for premium pay TV services) at 99 SEK (12 EURO) per month.
- ✓ Rental of box plus programme card for all available services (the premium pay TV services and the basic package) at 299 SEK (35 EURO) per month.

[11] Subscription fee may be required, but it is not decided yet.

[12] Subscription fee may be required, but it is not decided yet.

1.3 Operators and market structure

1.3.1 Concentration of the pay-TV market

The market share of the digital TV service providers on the Swedish pay-TV market in 1998 was an insignificant 0.5% of the pay-TV market. Regarding 1999, it has not been possible to obtain information about the pay-TV revenue of the service providers. In the following the pay-TV concentration is examined for the three distribution forms, based on subscription market shares. The subscription does not necessarily estimate the pay-TV market correctly, because many of the subscribers only receive the “basic” service package. This would be the equivalent of the“free-to-air” services in other DTTV markets like the UK.

- ✓ Canal Digital has 25.000 digital subscribers which is 5% of the satellite market and 1% of total pay-TV market
- ✓ Telia has 30.000 digital subscribers which is 1,5% of the cable TV market and 1,2% of total pay-TV market.
- ✓ Senda’s low share in the pay-TV market must be seen in the view of the service still being in its initial phase. It has not been possible to segment pay TV customers from those receiving only the basic tier. Senda had about 3,000 customers in mid-1999.

The presence of Canal+ as the only digital premium pay-TV channel in all three distribution forms gives it an attractive market position. It is the first instance of a premium pay-TV channel being represented on the terrestrial TV market in any Nordic country. It is hence interesting to follow the impact of Canal+ on development of digital TV and the whole media landscape in Sweden.

The Telia /Telenor merger could have had vital impacts on concentration of the TV markets in the Nordic countries. This was one of the concerns of the EU Commission when it in October 1999 approved the merger, conditioned by the selling off of the cable divisions. But on December 16th 1999 the Swedish and the Norwegian governments agreed to terminate the merger between Telenor AS and Telia AB. This in spite of the fact that the merger agreement was already signed in March 1999, and subsequently approved by the national Parliaments. The split ostensibly rests on disagreement over the interpretation of the shareholders agreement, especially the location/relocation of the various operations in the merged company. In the Norwegian general public there seems to have been concern about especially the location of the mobile operation.

1.3.2 Agreements between satellite operators, cable operators and DTT operators

The only digital satellite provider is Canal Digital. Some of the services are available both in Canal Digital's service provision and in Telia's service provision, but Canal Digital and Telia do not have any co-operation or access agreements. Telia has, e.g., distribution agreements with the content providers.

Teracom implements the terrestrial digital TV network and Senda handles the access and there are no technical agreements between these operators and Canal Digital or Telia.

Different services use different access systems and when a TV service, like Canal+, is available in all distribution forms, it is because the access system has been converted and adopted to each specific network.

1.3.3 Vertical integration

In the following the vertical integration is examined for all distribution forms. The analysis is based on a value chain consisting of four parts: Content, Service, Infrastructure and end-user equipment providers.

- ✓ Digital terrestrial TV: SVT is both content provider and owner (50%) of the service provider Senda. This indicates a vertical integration between content and service provision. Teracom, the infrastructure provider owns the other half of Senda, indicating a vertical integration between service and infrastructure provision.
- ✓ Digital satellite TV: A vertical integration can be seen in that CANAL+, which partly owns Canal Digital, offers its own TV channels (CANAL+ and CANAL+ GUL) in one of Canal Digital's digital TV packages.
- ✓ Digital Cable TV: Telia is both infrastructure and service provider, indicating a clear vertical integration. Telia has furthermore close co-operation with the set top box provider MACAB.

From the examples above a certain vertical integration can be identified between content and service provision as well as between service and infrastructure provision. Furthermore the equipment providers co-operate closely with service and infrastructure providers.

1.4 Technical issues

1.4.1 Decoders issues

The table below shows the CAS and APIs used in different networks as well as the set top box providers.

Set Top Boxes

Name	*Provider*	*CA*	*API*	*Free to air compatibility*	*16:9 compatibility*	*Integrated Modem*
MACAB (DBC-101)	MACAB/SAGEM	Viaccess	Open TV	Yes	Yes	Yes
MediaMaster, S, C and T	NOKIA	Embedded Viaccess (+ DVB CI)	Open TV	Yes	Yes	Yes
Philips digital box	Philips	Conax	Media Highway	Yes	Yes	Yes

Nokia provides the market with a range of set top boxes and Nokia boxes are available for all distribution mechanisms.

At present, only Nokia offers a set-top-box for digital terrestrial reception. The price is around 4.500 SEK (475 Euro). Senda is not geared to rent out set-top-boxes, but Boxer provides renting as an option. Technical information on Nokia's terrestrial box is listed in the following table.

Features of NOKIA Mediamaster 9820T		
• Complying with Nordic standard • Full DVB compatibility • MPEG-2 decoding • Flash memory and RAM memory 4 Mbytes	• Connections for TV/VCR, audio, PC, analogue satellite receiver, modem • Video format 4:3 and 16:9	• OTA programmable • PCMCIA decryption module • Integrated Viaccess

Set top boxes from MACAB/Sagem and the cable version of Nokia mediamaster can be used for Telia's digital cable TV. The MACAB/Sagem set top box used in Telia's network is exactly the same as the one used in Tele Danmark's cable TV network and STOFA's cable TV network in Denmark.

Canal Digital offers a Philips set top box in their rental service, but the satellite version of NOKIA's mediamaster can also be used for Canal Digital's services.

API choice

OpenTV announced in February 1999 a five-year agreement with Senda to provide interactive television in Sweden. This represents the first deployment of OpenTV technology in the emerging digital terrestrial market. As part of this agreement, OpenTV committed themselves to provide its implementation of the MHP specification, which is currently under development by the DVB (Digital Video Broadcasting) project. They promise that the MHP implementation will be compatible with Open TV technology but have yet to show how this will be achieved.

According to Per Mellberg, director of Teracom's R & D department "The Swedish API decision has been based on the service requirements, including interactivity and the need to start services in the first quarter of 1999. The decision made by Senda has broad support from broadcasters and the network operator Teracom".

1.4.2 16:9

SVT has announced that they will offer more 16:9 format programmes in the future, but 16:9 does not seem to play a major role in the introduction and marketing of digital TV in Sweden.

However, the number of 16:9 TV sets is increasing and some estimates show that by the end of 1999 there will be around 80.000 16:9 TV sets in Sweden.

16:9 TV sets (Thousand sets)

As of 31 of ecember	*1994*	*1995*	*1996*	*1997*	*1998*	*May 1999*
16:9 TV sets	0	0	0	8	30	55

1.4.3 Portable reception

Portable (and mobile) reception was used as an argument in the Swedish debate for the superiority of terrestrial digital TV, compared with other distribution mechanisms. There are arguments emphasizing the possibility for portable reception of terrestrial distribution in almost every document on digital TV. Mobile reception, however, reduces the available capacity; therefore the 'mobile reception argument' has not been used with the same strength as 'portable reception argument' in the Swedish debate.

The terrestrial digital TV solution will accommodate portable reception, where mobile reception will not be implemented in the first phase.

1.5 Conclusion

The development of Digital TV in Sweden has not been as fast as expected. The market for digital TV has so far remained a negligible part of the TV market. Development of the infrastructure for digital TV on the other hand has been very fast. Digital TV is available in the 3 distribution forms, satellite, cable and terrestrial networks and digital set top boxes are available for all these distribution forms.

The premium pay-TV service Canal+, several advertising services and public service services are available in the terrestrial network. This represents a new situation in Sweden, where the nation-wide terrestrial network has been dominated by the public service channels.

The access issues, in terms of access agreements between service providers, are not complicated, with Canal Digital as the only satellite service provider and all access issues in the terrestrial network being handled by Senda/Teracom. But the Swedish model with one central organisation for administration of access and multiplexing in the terrestrial network has potentially drawbacks with respect to development of new services and optimal use of available resources.

The set top boxes are still expensive compared with the charges for accessing the basic tier of services or even the more costly pay TV tiers. The boxes are still dedicated to a specific distribution form, but Nokia, which is one of the main providers of set top boxes in Sweden, has products for all distribution forms and these have a common interface. According to Nordig specifications, the new set-top-boxes must have connectors allowing an external demodulator to be attached to the boxes.

A combination of factors are expected to increase the interest from consumers even in the short run and this will have positive impacts on the development of digital TV in Sweden.

Among these factors the most important are:

- ✓ falling prices of set top boxes (or availability of rental services),
- ✓ further development of the terrestrial network, both an increase in the number of services and expanded coverage
- ✓ digitalisation of other cable networks apart from Telia
- ✓ development of new digital services (both interactive services and more thematic TV services)
- ✓ change of the advertising legislation expected to lead to more commercial services being offered.

Lower prices for the boxes seem to be necessary to stimulate sales in the actual situation, but in a long-term perspective the growth and size of the digital TV market will depend on expansion of the quantity and quality of services.

2 Key figures for the Swedish market[13]

2.1 Country fundamentals

	1993	1994	1995	1996	1997	1998	1999
Population (millions)		8.750	8.820	8.840	8.850	8.854	
Households (millions)		3.960	4.010	4.140	4.220	4.290	
GDP (billion Euros)		153.000	165.000	169.000	174.000	180.000	

2.2 Equipment

As of 31 of December	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
TV households (millions)		3.670	3.710	3.750	3.790	3.830	
TV households (% of total households)		92.7%	92.5%	90.6%	89.8%	89.3%	-
TV households with 2 TV sets or more (millions)		1.350	1.410	1.490	1.560	1.630	
TV households with 2 TV sets or more (% of TV Households)		36.8%	38.0%	39.7%	41.2%	42.6%	-
TV households with 16:9 Television sets (millions)		0.000	0.000	0.000	0.008	0.030	
TV households with 16:9 Television Sets (% of TV Households)		0.0%	0.0%	0.0%	0.2%	0.8%	-
VCR households (millions)		2.680	2.860	3.040	3.220	3.300	
VCR households (% of TV households)		73.0%	77.1%	81.1%	85.0%	86.2%	-
Digital STB households (millions)		0.000	0.000	0.000	0.000	0.031	
Digital STB households (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.8%	-
IDTV[14] households (millions)		0.000	0.000	0.000	0.000	0.000	
Digital TV households (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.0%	-
Digital households[15] (millions)		0.000	0.000	0.000	0.000	0.031	
Digital households (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.8%	-

[13] Until 1998 all amounts are in ECU
[14] Integrated Digital TV Set
[15] Sum of Digital STB homes and digital IDTV Households

2.3 Television market estimates

Million Euros	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Analogue TV Market							
Public founding		365.510	317.580	375.320	387.730	363.280	
Advertising		221.000	221.160	238.080	288.010	312.310	
Subscription		148.000	147.000	162.000	168.000	187.000	
Total analogue TV		734.510	685.740	775.400	843.740	862.590	
Digital TV Market							
Public founding		0.000	0.000	0.000	0.000	0.000	
Advertising		0.000	0.000	0.000	0.000	0.000	
Subscription		0.000	0.000	0.000	0.000	1.000	
Total digital TV		0.000	0.000	0.000	0.000	1.000	
TV Market							
Public founding		365.510	317.580	375.320	387.730	363.280	
Advertising		221.000	221.160	238.080	288.010	312.310	
Subscription		148.000	147.000	162.000	168.000	188.000	
Total TV market.		734.510	685.740	775.400	843.740	863.590	

2.4 Details of the pay-TV market

Cable

	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Home passed (millions)		2.100	2.100	2.200	2.450	2.600	
of which digital (millions)		0.000	0.000	0.000	0.690	1.100	
Home passed (% of TV households)		57.2%	56.6%	58.6%	67.0%	67.9%	
of which digital (% of TV households)		0.0%	0.0%	0.0%	18.2%	28.7%	
Analogue Basic Subscribers (millions)		1.830	1.850	1.900	1.930	2.000	
Digital package subscribers (millions)		0.000	0.000	0.000	0.000	0.025	
Analogue Basic Subscribers (% of TV households)		49.9%	49.9%	50.7%	50.9%	52.2%	
Digital package subscribers (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.7%	

Satellite

	1993	1994	1995	1996	1997	1998	1999
Satellite households (millions)		0.390	0.450	0.510	0.610	0.700	
Satellite households (% of TV households)		10.6%	12.1%	13.6%	16.1%	18.3%	
Satellite subscribers (millions)		0.280	0.390	0.400	0.430	0.500	
Satellite subscribers (% of TV households)		7.6%	10.5%	10.7%	11.3%	13.1%	
of which digital (millions)		0.000	0.000	0.000	0.000	0.006	
of which digital (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.2%	

Terrestrial TV

	1993	1994	1995	1996	1997	1998	1999
Analogue Pay-TV services							
Pay-TV subscribers (millions)		0.000	0.000	0.000	0.000	0.000	
Pay-TV subscribers (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.0%	
***Digital TV services**							
Homes covered (millions)		0.000	0.000	0.000	0.000	0.000	
Homes covered (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.0%	
IDTV households (millions)		0.000	0.000	0.000	0.000	0.000	
IDTV households (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.0%	
Pay-TV households (millions)		0.000	0.000	0.000	0.000	0.000	
Pay-TV households (% of TV households)		0.0%	0.0%	0.0%	0.0%	0.0%	