Digital TV

–

More than TV?
Digital Production

Digital cameras
Digital video standards
Digital editing
Digital storage
  in expectation of a tapeless world (2010)
Digital Playout

1. Digital Content
2. Coder
3. Server
4. Operation control
5. MPEG 2 data compression
6. Data transfer from interactive services
7. Multiplexer
8. Modulator
9. Uplink
10. Downlink
11. Decoder
12. TV set
13. Remote control
Digital **Television:**
DVB (Europe, Australia, Hongkong, parts of South America)
ATSC (USA, East Asia)
ISDB (Japan)

Digital **Coding:**
MPEG 1–21

Digital **Radio:**
DAB
DRM
Members of DVB are operating in 35 countries.

The aim of DVB:
»Our vision ist to build a content environment that combines the stability and interoperability of the world of broadcast with the vigour, innovation and multiplicity of services of the world of the internet.«
Many geostationary satellites are launched for broadcast relatively cheap reliable

no return channel
Digital cable seems to be the ideal technology for the DVB aims. A cable modem can provide a return channel for all sorts of user interaction.

In several European countries, especially Germany (57% of the TV households are cable connected) the digital switch is belated. Regarding the opportunities of interactive TV the »window of opportunity« seems to be closed: 4 millions of German DSL users enjoy broadband interactivity over the telephone line and not over their cable connection. The German provider T-Online will even offer a DSL box that has to be connected with the TV set and delivers expensive »premium« content.

Cable networks offer several opportunities for the delivery of paid content: monthly subscription, per-per-view etc. The prerequisite for these is an conditional access module in the receiver. The digital installations add the possibility to create multimedia user interfaces with EPGs and teaser content. If a cable modem is connected, all transactions can be executed immediately via the return channel.
DVB terrestrial operates in several European countries (GB, Finland, Sweden …) and also in Singapore. The German roll-out started in Berlin, where 200,000 DVB-T receivers are sold and the analog transmission is switched off. The audience in Berlin can select between 28 TV channels and two additional data channels – which require MHP enhanced receivers.

25% of the DVB-T users in Berlin are former cable customers who selected the cheaper solution.

The vantages of DVB-T are: possibility to distribute local, nearly »cellular« content, portable and even mobile reception with small antennas.
Digital broadcast for handhelds, e.g. PDAs or mobile phones.

Video: 320x240px, MPEG-4, 15fps
Audio: AAC 32–128 kbps
Data rate combined: appr. 300–380 kbps

Aimed at the joint utilization of digital terrestrial television and telecommunications.

»There has been no convergence of transmission technologies and no convergence of distribution services, thus far. But the convergence in content distribution, and technology and system convergence in user equipment is happening.«
Goeran Wahlberg, Nokia Corp.’s director for Concepts and Technology.

DVB-H could solve the bandwidth problem of IP based video transport which hinders the success of streaming concepts for mobile devices. The mobile user can interact with a content which is distributed via broadcast on the same device.
**Handheld + PVR**

**Memory Stick Video Recorder**
Resolution 160x112px .. 320x240px, 15fps, MPEG-4.
Over 16 hours of video content in the lowest setting, or 4 hours in top quality with a 1gig Memory Stick Pro media card.

<table>
<thead>
<tr>
<th>Recording Mode</th>
<th>HQ</th>
<th>SP</th>
<th>LP1</th>
<th>LP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit Rate (video)</td>
<td>384 kbps</td>
<td>218 kbps</td>
<td>96 kbps</td>
<td>64 kbps</td>
</tr>
<tr>
<td>Frame Rate</td>
<td>15 fps</td>
<td>15 fps</td>
<td>15 fps</td>
<td>15 fps</td>
</tr>
<tr>
<td>Frame Size</td>
<td>320*240</td>
<td>320*240</td>
<td>160*112</td>
<td>176*144</td>
</tr>
<tr>
<td>Sampling Rate</td>
<td>24kHz</td>
<td>24kHz</td>
<td>24kHz</td>
<td>24kHz</td>
</tr>
<tr>
<td>Stereo/Mono (sound)</td>
<td>Stereo</td>
<td>Stereo</td>
<td>Mono</td>
<td>Stereo/Mono</td>
</tr>
<tr>
<td>Bit Rate (audio)</td>
<td>128kbps</td>
<td>64kbps</td>
<td>32kbps</td>
<td>64kbps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Memory Stick Media Recording Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approx. Recording Time</strong></td>
</tr>
<tr>
<td>High Quality (HQ)</td>
</tr>
<tr>
<td>Standard Play (SP)</td>
</tr>
<tr>
<td>Long Play (LP1)</td>
</tr>
<tr>
<td>Long Play 2 (LP2)</td>
</tr>
</tbody>
</table>
Services with DVB-T / -H and UMTS
## Chances & Pitfalls of Digital TV

<table>
<thead>
<tr>
<th>More channels</th>
<th>Equal or lower quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher quality</td>
<td>Higher costs per bandwidth</td>
</tr>
<tr>
<td>Lower costs per channel</td>
<td>Equal audience</td>
</tr>
<tr>
<td>Increased turnover</td>
<td>Audience is not innovative</td>
</tr>
<tr>
<td>Enhanced TV</td>
<td></td>
</tr>
<tr>
<td>Digital Media Network</td>
<td></td>
</tr>
</tbody>
</table>
Enhanced and Interactive TV

TV
   plus basic data (now and then, short info & long info)

Enhanced TV
   middleware (API = application programming interface) enables the delivery of multimedia content to the consumer

Interactive TV
   enhanced TV plus return channel (modem, cable modem; external channels: SMS ...)

APIs in Europe
   MHEG5, MediaHighway, OpenTV, Microsoft TV, MHP
Example: ARD online channel 1998

Ocean Cities
Städte im Meer - Vision und Realisation

Fenster Zukunft
Eine Bildgalerie der Weltausstellungen

Der ARD-Online-Kanal wird ab Mitte November 1998 dreimal täglich aktualisiert.
Der ARD-Online-Kanal - mehr als Internet, mehr vom Fernsehen.
First lessons of multimedia TV programming
Interference as enhancement :-)

[Image: Interference scene]
iDTV penetration in Europe

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>7,915</td>
<td>10,515</td>
<td>12,384</td>
<td>13,575</td>
<td>14,019</td>
<td>14,085</td>
<td>14,002</td>
</tr>
<tr>
<td>France</td>
<td>3,452</td>
<td>3,863</td>
<td>5,608</td>
<td>7,632</td>
<td>10,049</td>
<td>12,109</td>
<td>13,529</td>
</tr>
<tr>
<td>Spain</td>
<td>2,522</td>
<td>2,717</td>
<td>4,001</td>
<td>5,401</td>
<td>6,718</td>
<td>7,692</td>
<td>8,487</td>
</tr>
<tr>
<td>Italy</td>
<td>1,758</td>
<td>2,710</td>
<td>4,907</td>
<td>7,301</td>
<td>9,360</td>
<td>11,441</td>
<td>13,320</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nordics</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>705</td>
<td>986</td>
<td>1,575</td>
<td>2,088</td>
<td>2,655</td>
<td>2,953</td>
<td>3,146</td>
</tr>
<tr>
<td>Denmark</td>
<td>387</td>
<td>633</td>
<td>929</td>
<td>1,428</td>
<td>1,808</td>
<td>1,886</td>
<td>1,925</td>
</tr>
<tr>
<td>Norway</td>
<td>403</td>
<td>542</td>
<td>768</td>
<td>956</td>
<td>1,196</td>
<td>1,344</td>
<td>1,450</td>
</tr>
<tr>
<td>Finland</td>
<td>73</td>
<td>122</td>
<td>228</td>
<td>399</td>
<td>630</td>
<td>908</td>
<td>1,188</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benelux</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>99</td>
<td>189</td>
<td>317</td>
<td>566</td>
<td>906</td>
<td>1,494</td>
<td>2,180</td>
</tr>
<tr>
<td>Belgium</td>
<td>-</td>
<td>-</td>
<td>350</td>
<td>681</td>
<td>956</td>
<td>1,314</td>
<td>1,660</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>5</td>
<td>11</td>
<td>17</td>
<td>25</td>
<td>36</td>
<td>50</td>
<td>64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rest of Europe</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>-</td>
<td>-</td>
<td>541</td>
<td>1,456</td>
<td>2,693</td>
<td>4,268</td>
<td>5,928</td>
</tr>
<tr>
<td>Switzerland</td>
<td>169</td>
<td>296</td>
<td>422</td>
<td>588</td>
<td>795</td>
<td>1,040</td>
<td>1,308</td>
</tr>
<tr>
<td>Greece</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>286</td>
<td>770</td>
<td>1,007</td>
<td>1,283</td>
</tr>
<tr>
<td>Ireland</td>
<td>118</td>
<td>148</td>
<td>207</td>
<td>278</td>
<td>359</td>
<td>437</td>
<td>513</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>156</td>
<td>242</td>
<td>349</td>
<td>484</td>
</tr>
<tr>
<td>Portugal</td>
<td>6</td>
<td>14</td>
<td>40</td>
<td>88</td>
<td>161</td>
<td>265</td>
<td>402</td>
</tr>
</tbody>
</table>

Source: Forrester Research, 2002
Typical interactive TV services

Publishing services:
- programme guides (EPG)
- information services (Weather, Traffic, Local news)

Services synchronised with programme broadcasts (Enhanced TV):
- programme demonstrations
- additional information pop-ups, tickers in the OSD area
- parallel games
- interactive advertising

Transactional services:
- T-Commerce
- Video on demand (VOD)
- Home Banking
- games on line
Example: Electronic Program Guide
Example: Digital Teletext and Multimedia Features
Walled garden (vertical market)
As many components as possible in the hand of one company: network, platform (API), conditional access and encryption, contract with customer, set top boxes, …
In a vertical market, the compromise with respect to set top box specifications is that between capital expenditure and revenue. The degree to which enhancements are displayed and interactivity provided is based on the likely incremental revenue (or avoided cost) that these services will yield.

Open access (horizontal market)
As many components as possible are accessible for all market participants. The API should be open (if not Open Source). There are many regulations in the broadcast and telecommunications sector, and the high price of the distribution of content is also selective enough.
T-Commerce (analog version)
T-Commerce (digital version)
Identificazione Utente

Codice Utente 00632820

Password ********

CPI ****

Entra
Cambia Password

Premere Ok per attivare la tastiera virtuale e immettere i dati

ok conferma seleziona

iguada esc indietro
Interactive advertising

1. Ford Focus

2. Smart

3. MTV / Nescafé / Pong
Hull – the city with the white telephone boxes – has a unique iTV system: TV over DSL.
ATSC Advanced Television Systems Committee
FSIP program and system Information Protocol
DASE DTV Software Application Environment (first steps in Korea)

Until July 2007 all TV sets sold in the USA must have a digital receiver module. A terrestrial TV station only gets a new license if it is offering at least one HDTV channel.

HDTV / SDTV

Table A3 Compression Format Constraints

<table>
<thead>
<tr>
<th>vertical_size_value</th>
<th>horizontal_size_value</th>
<th>aspect_ratio_information</th>
<th>frame_rate_code</th>
<th>progressive_sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1080</td>
<td>1920</td>
<td>1,3</td>
<td>1,2,4,5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4,5</td>
<td>0</td>
</tr>
<tr>
<td>720</td>
<td>1280</td>
<td>1,3</td>
<td>1,2,4,5,7,8</td>
<td>1</td>
</tr>
<tr>
<td>480</td>
<td>704</td>
<td>2,3</td>
<td>1,2,4,5,7,8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>640</td>
<td>1,2</td>
<td>4,5</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend for MPEG-2 coded values:
aspect_ratio_information: 1 = square samples, 2 = 4:3 display aspect ratio, 3 = 16:9 display aspect ratio
frame_rate_code: 1 = 23.976 Hz, 2 = 24 Hz, 4 = 29.97 Hz, 5 = 30 Hz, 7 = 59.94 Hz, 8 = 60 Hz
progressive_sequence: 0 = interlaced scan, 1 = progressive scan
Enhanced TV and interactive TV:

Internet via Cable
WebTV resp. MSN TV (appr. 500,000 households)
DASE: specified as module of ATSC, no examples in the USA, only in Korea
VoD: The roots

Denton, Tx. 1993

VoD killer application
2.8 videos per month and household

Orlando, Fl. 1994-97

100 Mio. USD investment
4000 participants. VoD, T-commerce, EPG, games
Video on Demand permits television viewers to choose, view and pause a program whenever they want. Quality VoD requires a substantial broadband connection (up to 5 Mbps) to every user. It also requires a server that can support a unicast delivery system with multiple viewers requesting the same program at different times.

While VoD has suffered many unsuccessful attempts, the dramatic drop in cost of hard drive and fiber-optic technology makes VoD financially viable today in various targeted applications – most notably in the hotel industry.

Three competing technologies offer some of the capabilities of VoD at a lower cost:

1. Near Video On Demand (NVoD) repeats a small number of popular programs at frequent intervals for large groups of users, but has no ability to pause or rewind the program.
2. Personal Video Recorders (PVR) such as TiVo pre-cache limited content on a hard drive in the viewer's set-top-box, offering full VoD functionality for favorite pre-selected programs.
3. Internet streaming provides the choice and control of VoD, at a much lower quality because of the lower bandwidth.
VoD example AT&T
Web TV example

- Web homepage
- TV homepage
- »Go interactive« on TV screen
- Logon in MSN network
- Connection to MSN
NEW YORK TIMES | April 4, 2002, Thursday

Interactive TV Is Finally Here, Sort Of

By JENNIFER 8. LEE (NYT)

ABSTRACT - Number of households with interactive television is expected to climb by end of 2002 to more than 15 million households; services include video on demand, expanded content for ESPN and Weather Channel, local information and selling channels; two-way interactivity with television programs appears to be far off because of cost and consumers' resistance to convergence of television and computing; cable provider Insight exemplifies trend toward interactivity with services that include local weather, traffic and music performances.
Convergence – what kind of convergence?

PC and mobile phone, TV and PDA …

2. Convergence of production.  
»Write once – distribute to many platforms«. The golden age of CMS.

3. Convergence of content.  
Platform specific, network specific and display specific content is desired.

One-way, (crippled) two-way, store-and-forward …

Conclusion: convergence should stay in the field of ophthalmology
Interaction with media

1. simple interaction:
   Multiple choice
   Input fields and simple forms
   order forms

2. communication:
   E-mail?
   SMS
   Multi user games
   Chat

3. intervention:
   MUD
   control of actions in live programs
   …
Gefühlssehrt Chat

Dates * Flirts * Herzklopfen

(exodus) lol mast
(madgirl12) abba erger mich mal
(exodus) mein korn ist für mich*g*
(eve20) tag zusammen
(madgirl12) lol
(mast3r) exo den kannste auch gern für
dich allein haben :)
(madgirl12) whos a freak like me??
(mast3r) ich dachte eher so an cocktails
und so
(madgirl12) "g"
(mast3r) halt alles was teuer is -g-
(exodus) ein prosit, ein prosit, der
gemütlichkeit *sing*
(leinadbhv) ***
(madgirl12) oh
(exodus) lol mast
(madgirl12) cousin erger mich mal

Kontakt Börse Bremen

Partnersuche
Treffpunkte
Flirts
Beratung
Spiele

Schick Deine Chat SMS an: 777-3435
powered by bremen 24
Crossmedial data exchange
Who is afraid of media ruptures?

NRK program with two video channels in two windows, SMS chat and polling
Killer app in Portugal

Source: CaboTV
FROM: Erden Gürcan
26.10.2003  18:30

The killer of TV advertising
1. The production and distribution and all other technical components of TV will be digital (timeline 2010).

2. TV will not totally »converge« with other media, but will include and integrate more communication and interaction.

3. To avoid a further downgrading of its role in the digital media network, TV has to stress its core assets: excellent video, popular programming …
Got the picture? Thank you.

Contact: hero@weisses-rauschen.de