



Digital TV

Wolfgang Leister
IMEDIA



Television

- Paul Nipkow (1884)
- A.A. Campbell Swinton (1911): CRT
- von Ardenne, Zworykin, Schoenberg, Bartholemy
- Broadcast: 1936 Berlin Olympics
- Different standards: lines: 240, 405 (Gr.Br.), 441 (Germany), 455 (France), 340 (New York), ...
- 1941: 525-line 60 frames/sec (America)
- 1952: 625-line 50 frames/sec (Europe)



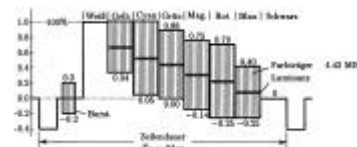
Colour Television

- 1953 RCA and Hazeltine labs ↑ NTSC
- 1961 Henri de France ↑ SECAM
Sequentiel Couleur à Memoire
- 1961 Dr Walter Bruch ↑ PAL
Phase Alternation by Line



Colour Television

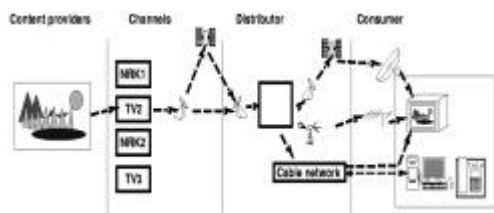
- PAL
- SECAM
- NTSC



- U,V components, (0,1 components NTSC)
- ampl. modulation 90°, 4.43 MHz



Roles

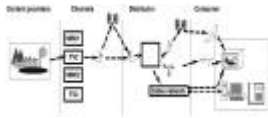


Characteristics of Digital TV

- mostly broadcast
- individualize for customers
- but: individuality within limits
(much of the content is the same, the view is different, the time is different)
- user wants interactivity
(local on TV, return channel, ...)

What is digital in digital TV?

- Production
- Content
- Transmission
- API
- Cond. Access
- Applications
- Return channel



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Digital TV Production

- Use of digital equipment
- Computer graphics / animation / ...
- Digital TV production tools
- Interactivity (xlets, ...)

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Digital Content

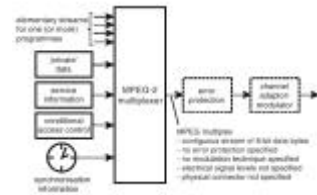
- Storage format: MPEG 2, MHP
- Streaming format: MPEG2 TS
- Interactive Content: HTML, XML, (Flash), other Web standards ...
- Java xlets

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Streaming

- Streaming format: MPEG2 TS

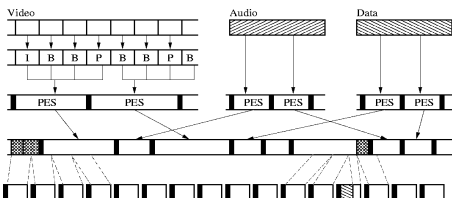


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Content Transmission

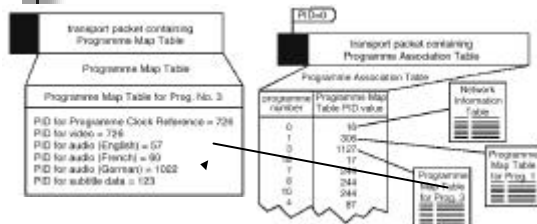
MPEG-2 TS



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Programme Service Information

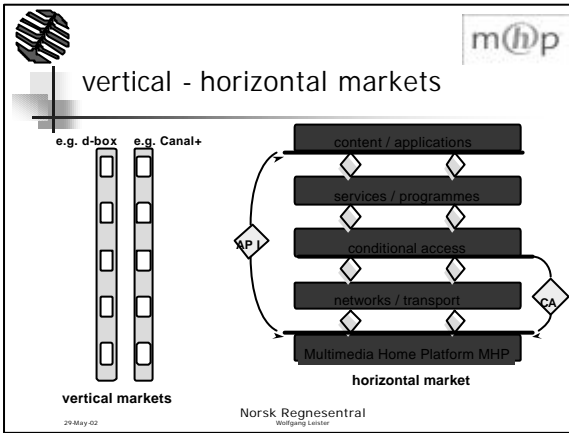


PMT: PID=1127

PAT: PID=0 (always)

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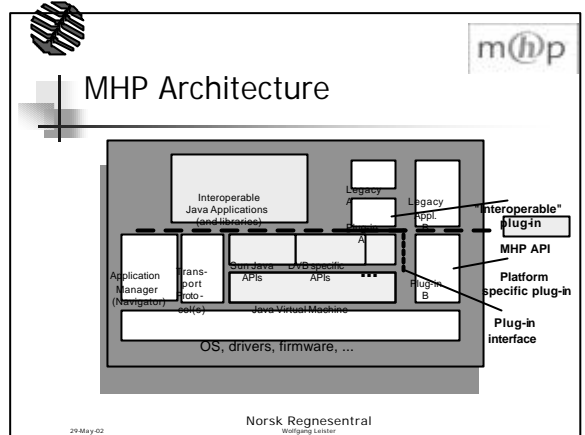
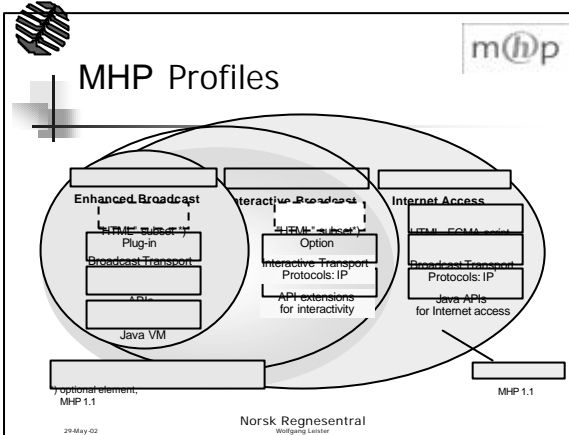
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- ## MHP
- MHP = API for digital TV, defined by DVB
 - MHP1.0 formally accepted by ETSI
 - Enhanced Broadcasting Profile
 - Interactive Broadcasting Profile
 - MHP1.1 (spring 2001)
 - Internet Access
 - Based on DVB-Java
 - HTML / XML
 - Enhanced & Interactive Broadcasting (optional)
 - Existing (legacy) APIs as plug-ins
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- ## Specification Elements (1)
- MHP architecture
 - Detailed profile definition enhanced and interactive broadcasting
 - Content formats including PNG, JPEG, MPEG-2 Video/Audio, subtitles and resident and downloadable fonts
 - Mandatory transport protocols including DSM-CC object carousel (broadcast) and IP (return channel),
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- ## Specification Elements (2)
- Application model and signalling
 - Hooks for HTML content formats
 - DVB-J platform DVB defined APIs and selected parts from existing Java APIs, JavaTV, HAVI and DAVIC
 - Security framework
 - Graphics reference model
 - Annexes DSM-CC OC profile, text presentation, min.platform capabilities, various APIs
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Nokia Media Terminal

- > Intel 566 MHz CPU
- 40 GB Disk
- 64 MB RAM
- MPEG2/DVB compliant
- Modem/DSL
- Accelerated 3D graphics
- Content protection
- Linux Operating System
- Mozilla, NaviBars, Plug-Ins, ...
- IP over MPEG
- ...



- DirectFB
- OstDev
- LinuxTV

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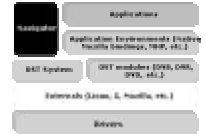


OstDev

- Framework: integrates MHP, Linux, Web
- Native linux applications, e.g. games
- Full IP access
- Support all web standards
- Support legacy iTV standards
- Extend to new application



and content standards
<http://www.linuxtv.org/>
<http://www.ostdev.net/>



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Typical DTV Applications



- Electronic program guides (EPG)
- Applications synchronised to TV content
- Games
- E- commerce
- Interactive advertising
- Internet access

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Research Areas

- New types of applications
- User Interface studies
- Networking Infrastructure
- Production tools

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