
Modern TV Technologies

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Key characteristics of TV techs

- Analog TV:
 - Analog TV signal
 - Linear program schedule
 - Limited services (and with local interaction)
 - Digital TV:
 - Digital TV signal
 - Transition from Channels to Services
 - Program-independent services
 - Interactive TV:
 - Even more flexible service model
 - Users can interact with the content source → Personalization
 - Many more services
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Key approaches for iTV

- Terrestrial, cable or satellite DTV (e.g., DVB-T, DVB-S, OCAP)
 - Standards (e.g., MHP for DVB)
 - Proprietary solutions (e.g., OpenTV)
 - IPTV
 - TV over IP networks. Internet protocols are used (RTSP, UDP, HTTP).
 - Offered through triple-play solutions by many ISPs and telecom operators.
 - WebTV or Internet TV
 - TV content in the Web. Integrated with other Web 2.0 trends (e.g., vodcasts, RSS).
 - Called also Over The Top (OTT) content
 - Hulu [www.hulu.com], NetFlix [www.netflix.com], HBO [www.hbo.com]
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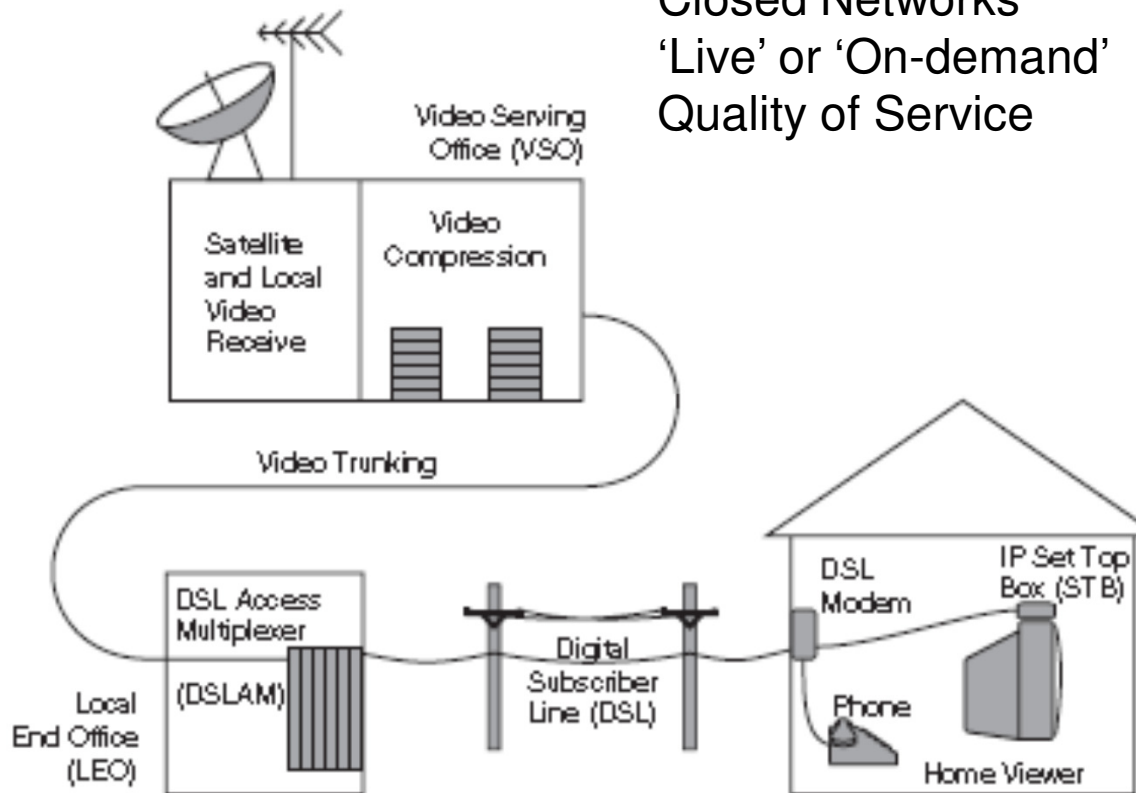
DVB basics



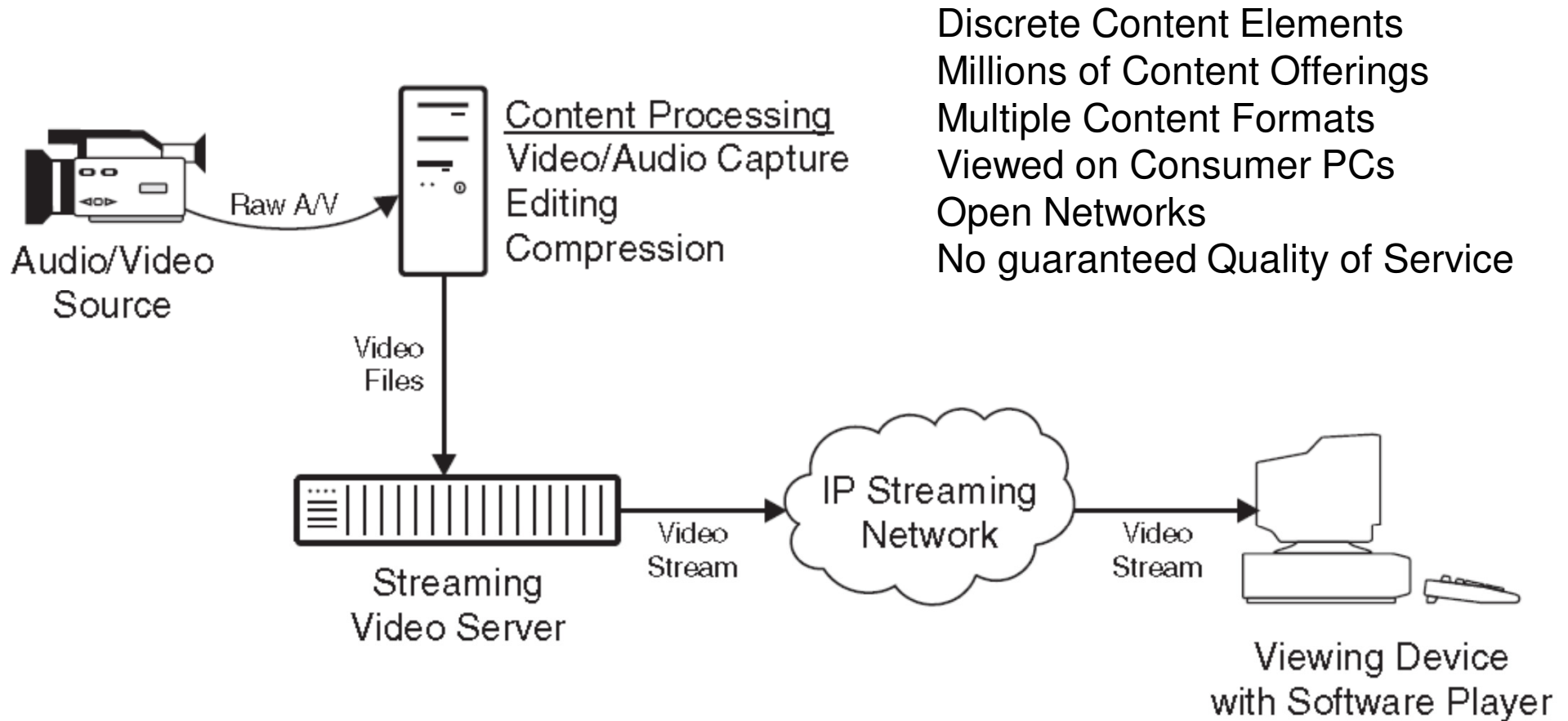
- Terrestrial or satellite broadcasting
 - Specific encoding/transmission protocols
 - Open technology (DVB project)
 - DVB-compliant receiver
 - A full set of specifications for transmission, metadata, subtitles, ...
 - The most widely deployed DTV system worldwide
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IPTV basics

- Continuous Content Streams
- Multiple Channels
- Uniform Content Format
- Viewed on Consumer Televisions via Set Top Boxes
- Closed Networks
- 'Live' or 'On-demand'
- Quality of Service



Internet Video basics

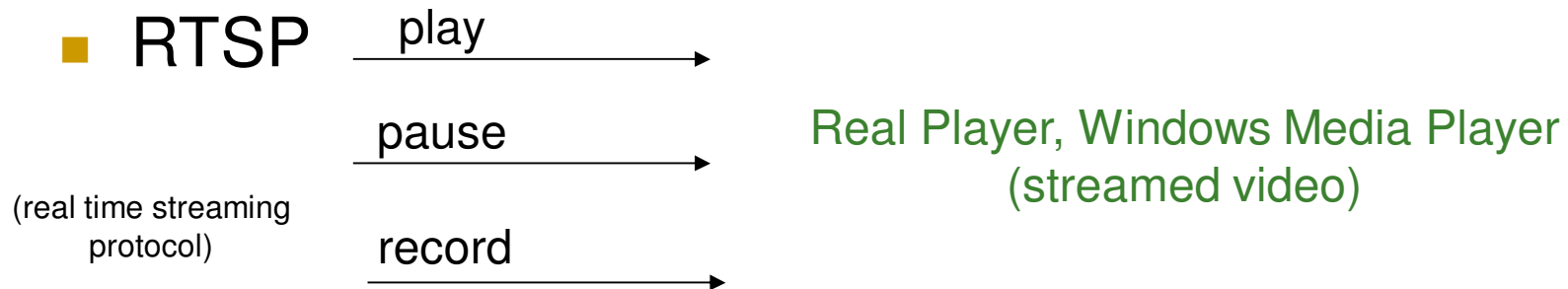
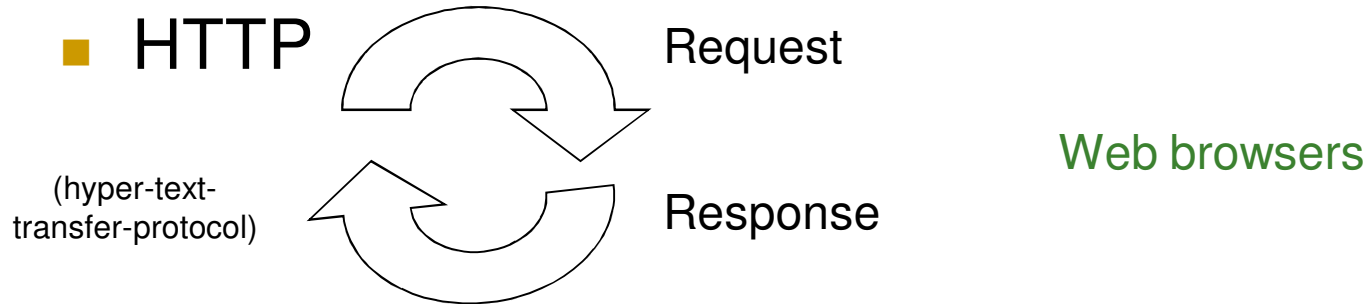


Hybrid Broadcast Broadband TV - HbbTV

- Tries to harmonize the various ways of TV transport (broadcast, broadband/OTT, IPTV) and provide a unified user interface to the user.
- Relies on a hybrid set top box
- Founded in 2010 and is supported by main industries:
 - Standardization, research, consumer electronic manufacturers, TV software developers, ...
 - ETSI standard



Internet TV Technologies



■ **IGMP**

(internet group management protocol)

- connecting to multicast stream (TV channel)
- changing from one channel to another

Example DTV/iTV Services

- Electronic Program Guide
 - Information about available TV content
 - Content filtering
 - A hot research area



Example DTV/iTV Services

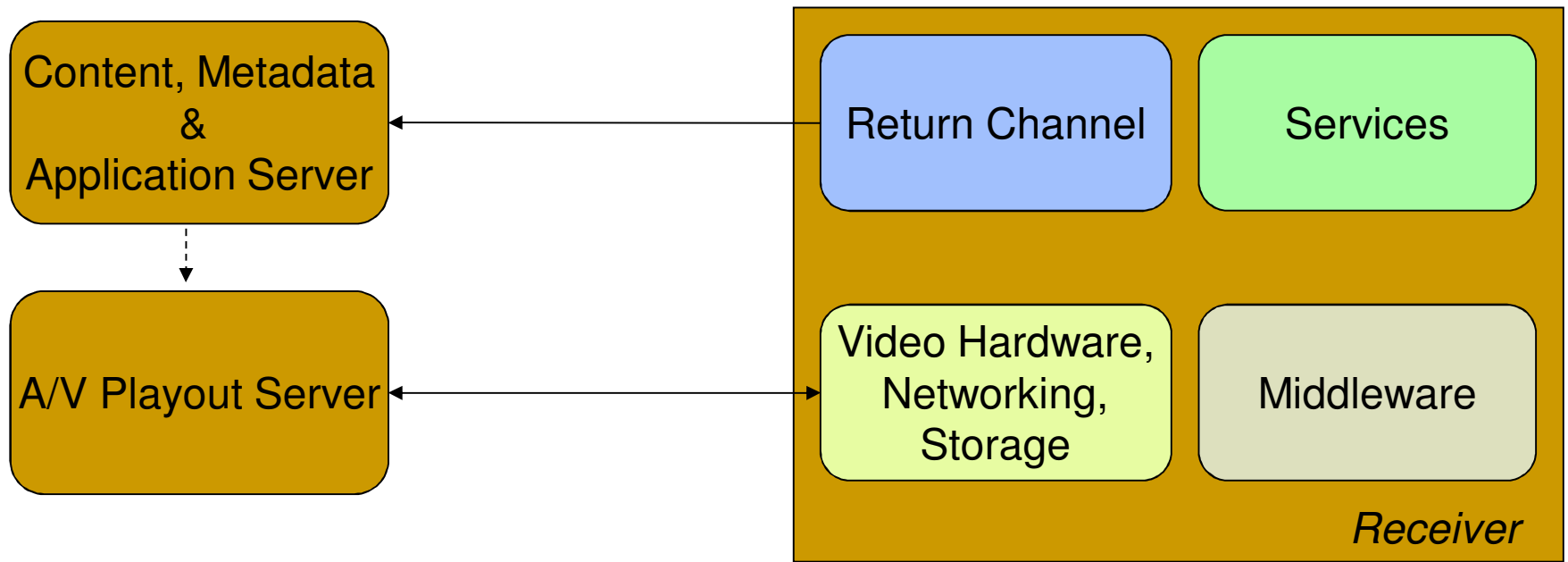
- Information Portal
 - Advanced Teletext service
 - High-resolution graphics and other hypermedia are supported
 - News, weather information, ...
 - Pay per View
 - The consumer purchases the right for a one-time view of a A/V content
 - Video-on-Demand (VoD)
 - Education
 - Enhanced distance learning
 - Feedback channel allows interaction between tutor and tutored
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Example DTV/iTV Services

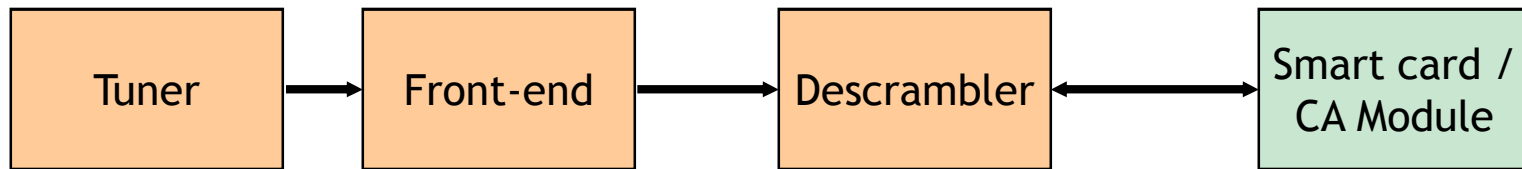
- Games
- Shopping
- Standard Internet Services
- Communication
 - Email
 - Forums
- Health
 - Telecare
- Banking

The screenshot displays the ITV Play Bingo Gold website. At the top, the 'itv play' logo is on the left, and a banner reads 'ITV Play's Bingo Gold is the UK's No.1 online Bingo Hall with over 800,000 friendly players!'. A navigation bar below the banner includes links for 'shows', 'games', 'what's on', 'watch now', 'community', 'register', and 'contact'. The main content area features a large 'BINGO Gold' graphic with a bingo card. Text next to it says 'Chat, Play and Win in the lively Bingo Gold Hall and you could win one of regular Progressive Jackpots of over £48,000!' and 'You can play Bingo now for as little as 20p. What are you waiting for?' with a 'play now' button. To the right, a 'CURRENT JACKPOT' section shows '£8,245.21' and a 'Top 'BINGO' Winners' list with names and amounts. Below this is a 'PLAYERS LOG IN' section with fields for 'Screen Name' and 'Password' and a 'GO' button. A testimonial from Deborah H. is shown with a photo and a quote: 'It feels wonderful. I've never had any money in my life so this is just incredible!'. At the bottom, there's a section for 'More great slots from ITV Play Games' with four game thumbnails: 'Spinning for Gold', 'Girl's Best Friend', 'Tycoon Treasure', and 'Bullion Bonanza'. The footer contains 'Terms and Conditions', 'site developed by Mice and Dice', and the 'itv play' logo with 'powered by jackpotjoy'.

Interactive TV Architecture



The DTV Receiver



Set-top box (STB)

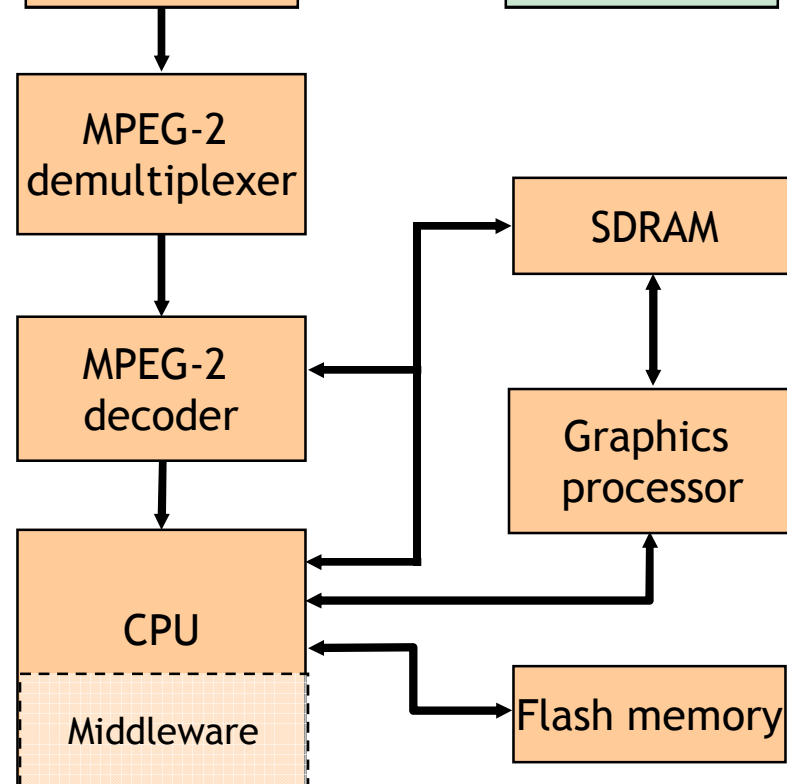
The most common type
Varies in functionality and features
from very basic to very advanced
May be integrated with other types of
device
E.g. a DVD player or PVR system

Integrated Digital TV (IDTV)

Receiver is built into a TV set
Can receive digital or analog
broadcasts with no extra hardware

PC with digital tuner card

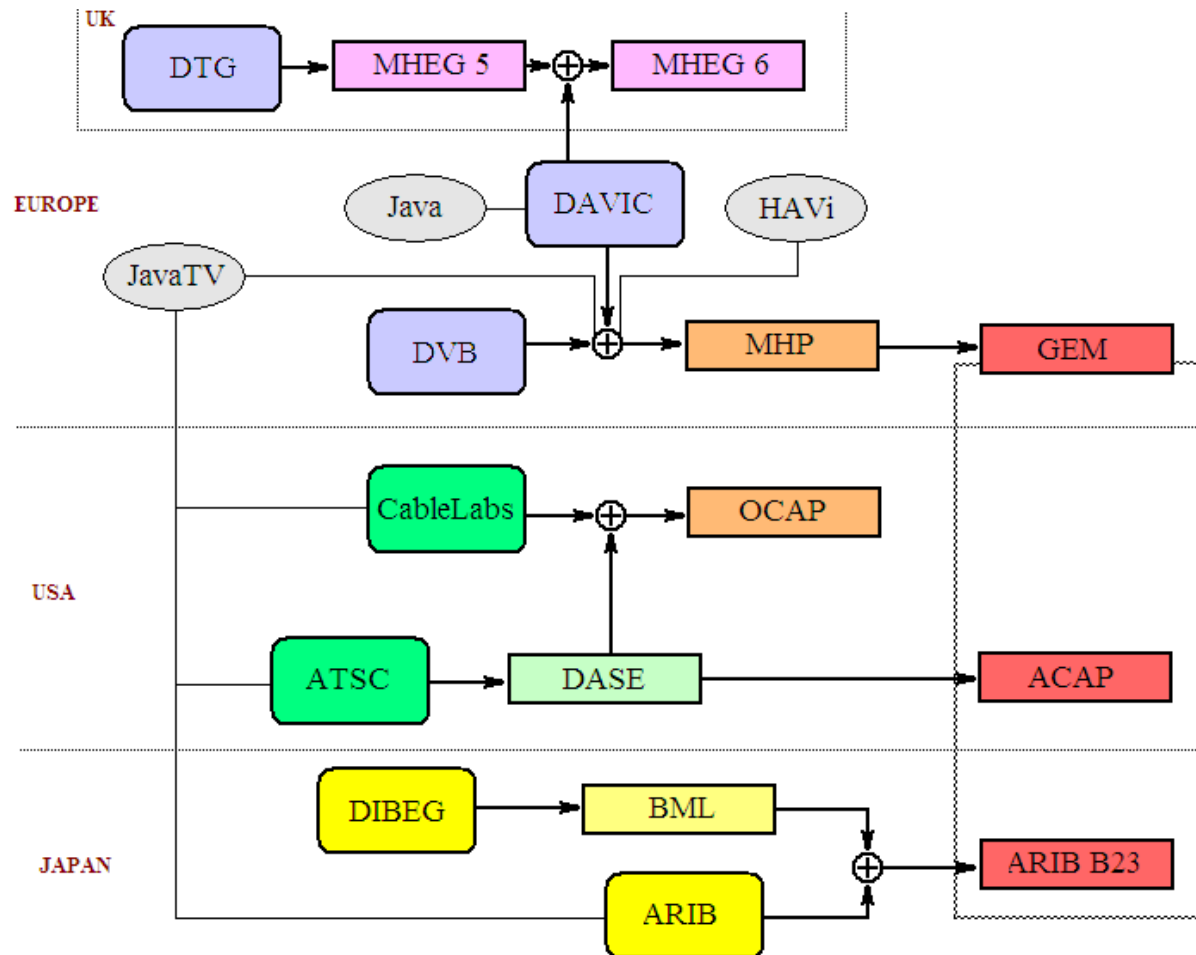
Similar to analog TV tuners, except it
decodes digital TV signals



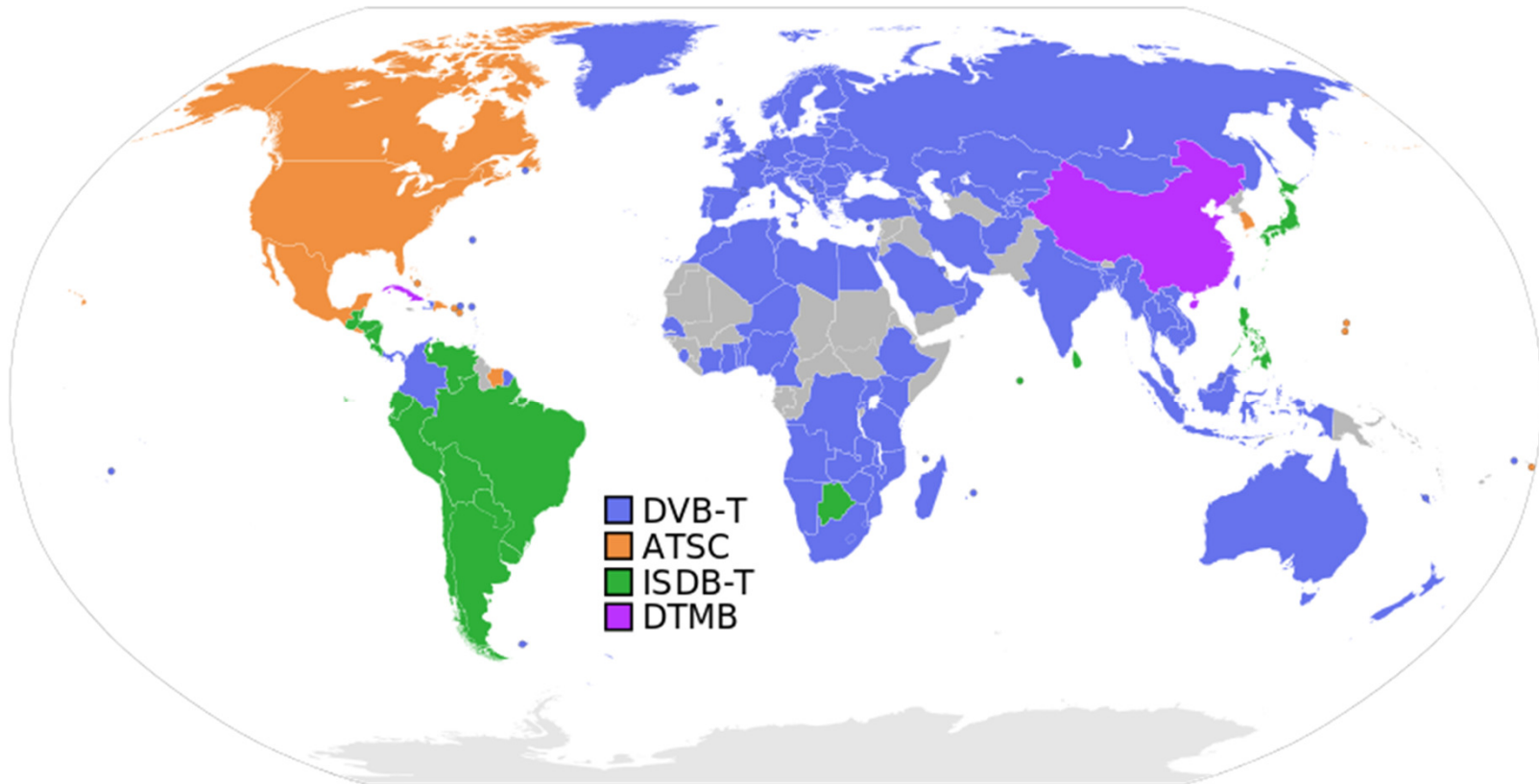
Conditional Access Module

- Decides who can see what content
 - It is easier for IPTV solutions
 - In satellite or CATV systems it usually involves encryption or scrambling
 - Decryption/Descrambling is performed through keys or smart cards
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The evolution of standards



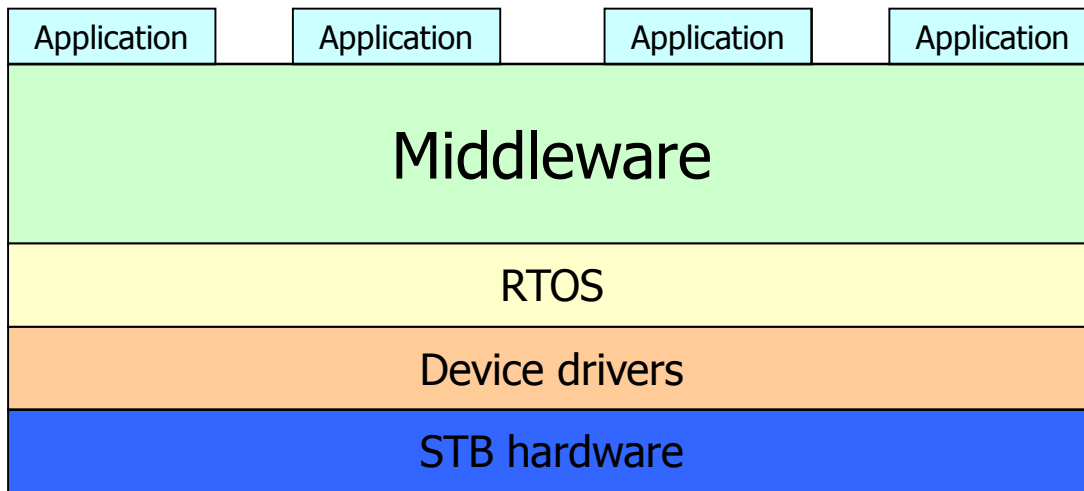
Current status of Terrestrial DTV



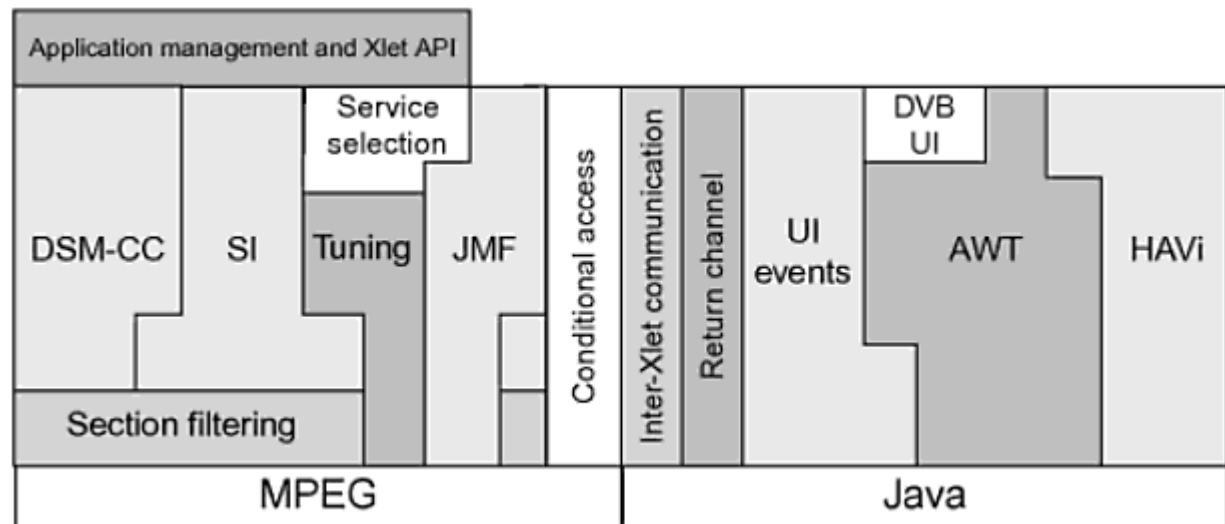
Middleware: definition

- Middleware is a software layer that sits on top of the OS in an STB
 - It allows developers to work without having to consider low-level issues for an STB
 - Drivers, Operating System, etc.
 - It makes it easier to write complex applications
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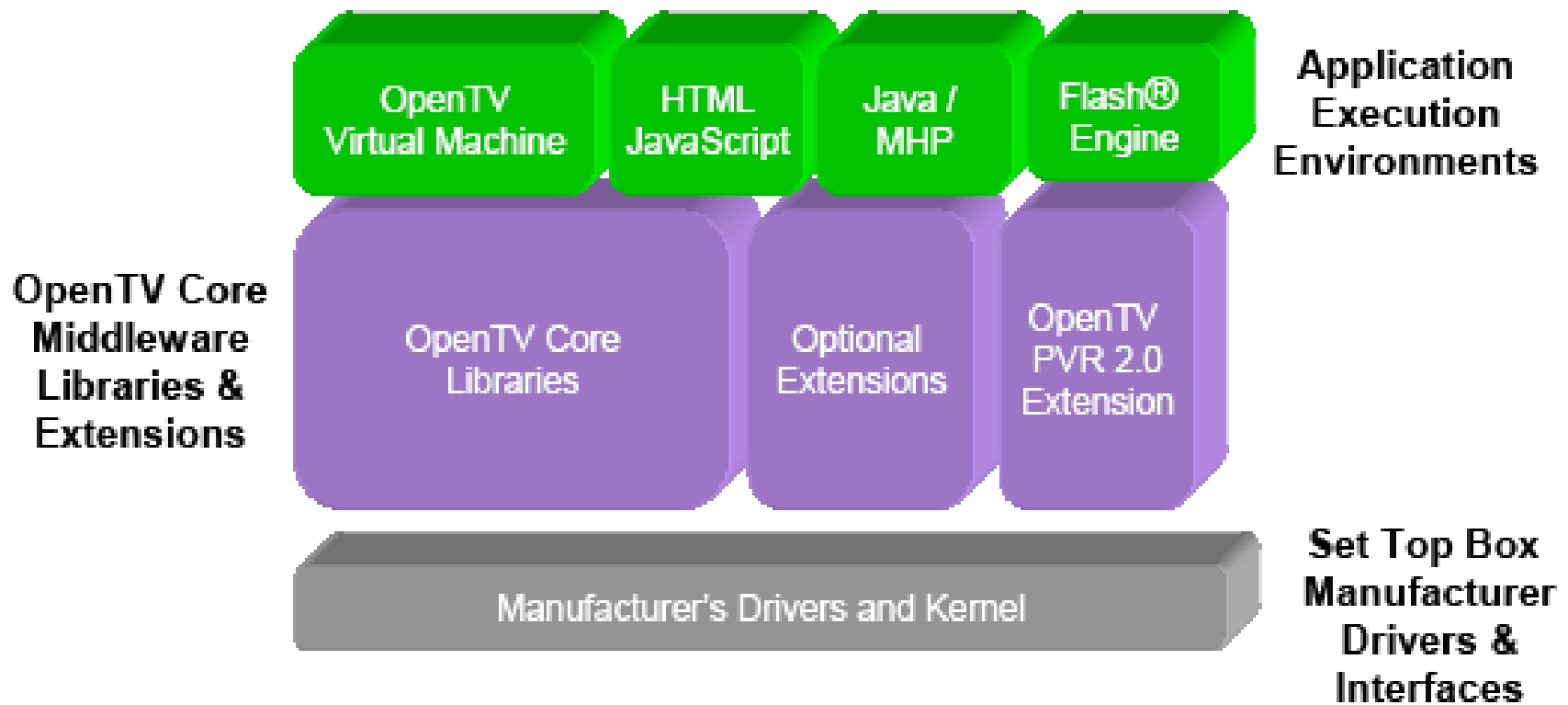
Middleware stack



MHP Stack



OpenTV



Middleware Technologies/Standards

Proprietary

- OpenTV Core (OpenTV)
- MediaHighway (Canal+)
- Microsoft TV (Microsoft)
- Liberate
- PowerTV
- NDS Core (NDS)
- ...

Open

- MHEG
- DAVIC
 - MHEG + Java
- MHP
 - Open middleware standard from DVB
 - Broad industry support
- OCAP
 - Open standard for US cable market
 - Based on MHP
- ACAP
 - ATSC's middleware based on MHP
- JavaTV
- ...

Common Middleware Services

- An application model
 - MPEG decoder/demux access
 - Graphics display
 - Access to multiple video planes
 - Access to graphics/video integration features
 - Service information access
 - User input (via Remote Control Unit or keyboard)
 - Supports a standard input model and key codes
 - Access to the return channel (TCP/IP)
 - Modem or broadband
 - Memory management
 - Software development environment
 - Usually C/C++ or Java
 - HTML may be supported
 - More complex features (Internationalisation, Web browsing & internet access)
 - Interaction with billing and other back-office applications
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Comparison of STB requirements

Different platforms have different hardware requirements and different STB cost

Platform	CPU	RAM	FLASH /ROM
MHEG-5	50 MHz	4 MB	2 MB
OpenTV	50 MHz	4-8 MB	4 MB
MHP Enhanced Broadcast Profile	80-130 MHz	8-16 MB	4 MB
MHP Interactive Broadcast Profile	80-130 MHz	8-16 MB	8 MB
MHP Interactive Broadcast Profile + DVB-HTML option	150-200 MHz	16-32 MB	8 MB
MHP Internet Access Profile	150-200 MHz	16-32 MB	8 MB

Other topics

- Digital Rights Management
 - Metadata
 - service information, content metadata, ...
 - Mobile TV
 - Some TV-capable devices exist
 - DVB-H
 - Mobile clients for Internet TV services
 - Business Models
 - Walled Garden for IPTV, pay-per-view, advertising, ...
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Further Reading

- ❑ <http://www.mhp.org>
 - ❑ <http://www.interactivetvweb.org>
 - ❑ “Interactive TV standards”, S. Morris & A. Smith-Chaigneau (Pub. Focal Press, ISBN 0240806662)
 - ❑ “IPTV and Internet Video. Expanding the Reach of Television Broadcasting”, Wes Simpson and Howard Greenfield (Pub. Focal Press, ISBN 9780240809540)
 - ❑ <http://www.euroitv.org/>
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