

Debugging Digital TV

MythTV MiniConf
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Overview

- Digital TV
 - Broadcast Technology
 - Audio / Video standards
- How to get it
 - Common DTV Hardware
 - Drivers
 - Software
- Tips And Tricks
- Open Forum



Exclusions

- Analogue Capture
 - Some discussion of hybrid cards
- Commercial Solutions
- Pay TV
 - Legal or otherwise

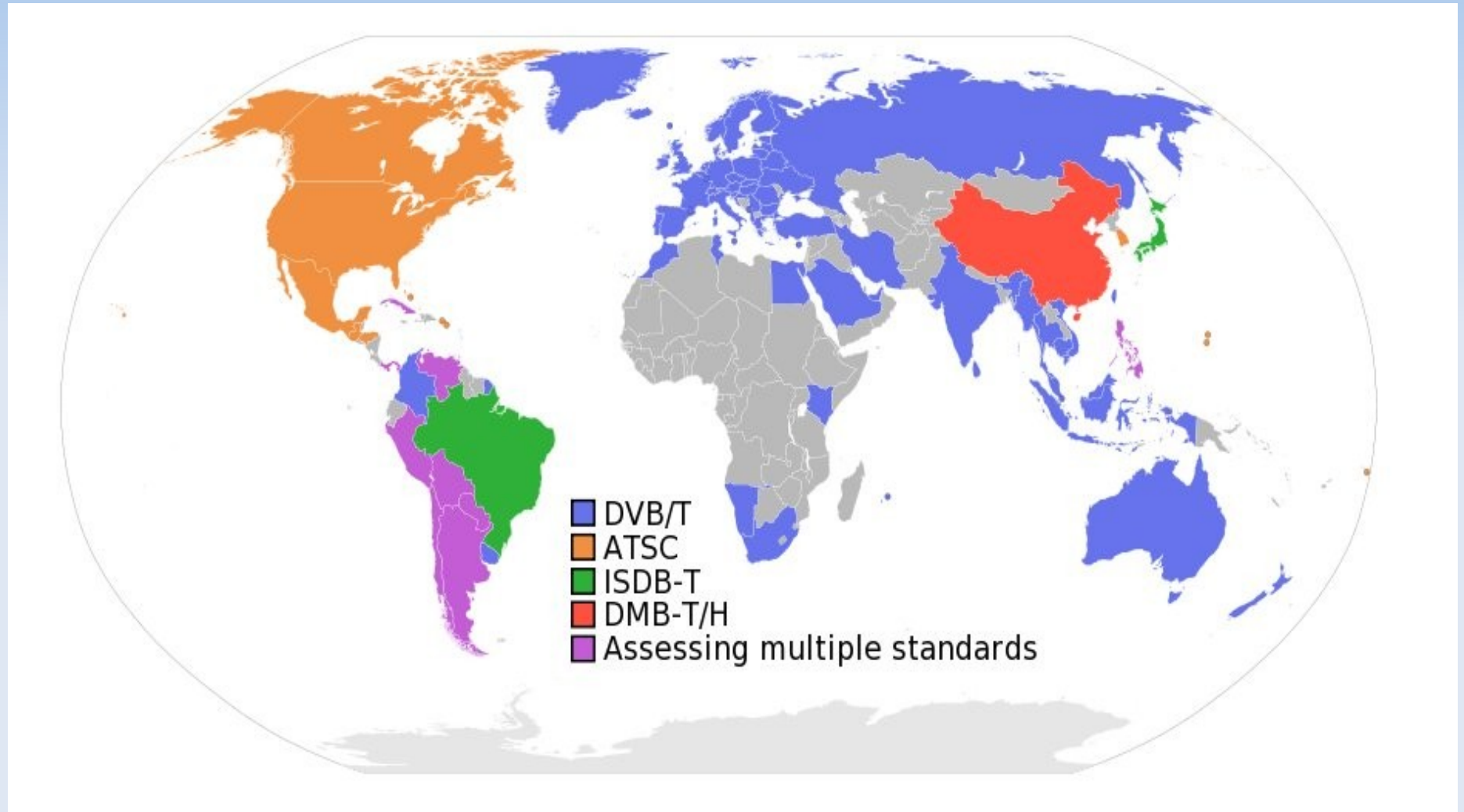


Why Digital

- Flexible and Efficient
- Better quality picture
- More channels
- HD capable
- Easier to encrypt
- Easier to capture



Digital TV Broadcast Standards



DVB - T/S/C/H

- Digital Video Broadcasting
 - Most dominant global standard
 - DVB-S + DVB-S2 = Satellite
 - DVB-T = Terrestrial
 - DVB-C = Cable
 - DVB-H = Handheld
 - DVB-T2, DVB-C2, DVB-SH



ATSC

- Advanced Television Systems Committee
- Designed as a replacement for NTSC
- US Centric, also used in Canada
- Focused on terrestrial services



ISDB

- Integrated Services Digital Broadcasting
- Japanese developed standard
 - ISDB-T
 - ISDB-S
 - ISDB-C
 - SBTVD - Sistema Brasileiro de Televisão Digital



DMB

- Digital Terrestrial Multimedia Broadcast
 - DMB-T
 - DMB-S
- China and Hong Kong
- Very similar to DVB



Audio/Video

- Country/Region specific standards
- SD and HD Video
 - 480i/480p 576i/576p
 - 720p50 720p60
 - 1080i50 1080i60
- MPEG2 or H.264 Video
- MP2, AC3 or HE-AACv2 Audio



Getting DTV

- What are we starting with?
- Know your hardware
 - PC / Laptop / STB
 - Digital Tuner
 - Beware hardware revisions
 - Chip details are very important
- Your local broadcast standards
- Your goals



DTV Hardware

- Four typical hardware classes
 - PCI
 - USB
 - PCIe
 - Firewire
- Beware
 - PCI might really be USB
 - PCIe is still (mostly) bleeding edge



Under Linux everything is DVB



DTV Drivers - linuxtv.org

- In distro - recent Fedora/Ubuntu/OpenSuSE
 - Reasonable card support and stable
- In Kernel
 - Generally stable
- In development
 - Newer hardware, some potential integration issues
- Out of tree
 - Em28xx
 - Vendor patched



DTV Firmware

- Damn those binary blobs
 - <http://linuxtv.org/wiki/index.php/Firmware>
- Download or extract from original Windows driver.
- Hauppauge now allow re-distribution



DTV Software

- Channel scanner
 - dvbscan / scan
 - w_scan
- Tuning
 - dvbtune
 - szap
 - tzap
- Analysis
 - dvbsnoop



Capture

- Basic
 - Mplayer
 - Dvbstream
- PVR Centric
 - MythTV
 - Freevo
 - Vdr
- TV Centric
 - Me-TV
 - Kvdr



Playback

- Mplayer
- FFmpeg
- VLC
- XBMC
- Totem
- Gstreamer
- Elisa
- MythTV



Editing

- Avidemux2
- Kino
- ProjectX
- MythTV



OTA EPG

- EIT – Event Information Table
 - Standard for most DVB services
 - DVB usually provides now/next EPG
 - Freeview in UK provides 7 day EIT data
 - Freeview AU plan on providing 7 day EIT data
 - Freeview NZ provide 7 day EIT on DVB-S service
- MHEG-5
 - Freeview NZ provides an 8 day EPG via MHEG-5



MHEG-5 EPG

2

Fri 2 Mar

9.30am Pilates TV

10.00am Infomercials

11.30am Shortland Street

12.30pm Dr Keith Ablow

1.30pm Tyra

2.30pm The Nanny

3.00pm The Go Show

3.25pm Cool Kids Cooking

3.30pm F-Zero

4.00pm Codename Kids Next
Door



TV2, 9.39am

No synopsis provided

G

Prog

Chnl

Prev Day

Next Day

OK Watch TV or

EXIT

EPG Now/Next

freeview



Interactive Services

- MHEG-5
 - Freeview and Freesat in UK
 - Ireland
 - freeview NZ
- MHP
 - Multimedia Home Platform
 - Deployed in Italy and Korea
 - Trialled in AU, Finland, Spain, Austria and others
- OpenTV
 - Popular with Pay TV broadcasters



US

- ATSC Service
 - Terrestrial and cable transmission
 - MPEG-2 Video for HD and SD
 - AC-3 Audio
 - SD services only 4:3
 - HD services only 16:9
- Impending analogue switch off in Feb 2009



AU

- DVB-T Service
 - Terrestrial transmission
 - MPEG-2 Video for HD and SD
 - MP2 and AC-3 Audio
 - EIT based EPG service – limited information
- Re branding as Freeview AU in 2009
 - Improved 7 day EIT based EPG
 - Expansion to 15 channels in most markets
- Some FTA DVB-S Services
 - Optus Aurora



- Freeview
 - DVB-T service
 - MPEG-2 Video, MP2 Audio
 - SD (576i) 4:3 or 16:9
 - EIT based EPG data
- Freesat
 - DVB-S service
 - MPEG-2 Video for SD
 - H.264 Video for HD
 - EIT based EPG data



New Zealand

- freeview
 - DVB-S service
 - MPEG-2 Video, MP2 Audio
 - SD (576i) 4:3 or 16:9
 - Dual EIT and MHEG-5 based EPG data
- freeview|HD
 - DVB-T based
 - H.264 Video for HD (720p/1080i) and SD (576i)
 - HE-AACv2 or AC-3 Audio
 - MHEG-5 based EPG data



Trends

- Analogue switch off
- Shift from MPEG-2 to H.264
 - Better quality picture
 - Improved use of spectrum
 - Additional services
 - FTA and Pay TV.
- New broadcast standards
 - DVB-S2, DVB-T2



Making it work

- Hardware selection
 - Check the forums / mailing lists / documentation
 - Confirm revision
 - Visual inspection
 - Plug and Play
- Hardware Verification
 - Visual inspection
 - lspci / lsusb
 - dmesg



Scanning for channels

- Satellite / Terrestrial / Cable
 - Sample files included with dvb-utils
- Satellite
 - Confirm satellite, transponder, LNB settings
 - Borrow a STB
- Terrestrial
 - w_scan can perform a full UHF/VHF scan



Testing

- Mplayer
 - Get a recent build
 - SVN rather than distro
 - Produce a channels.conf file with scan or w_scan
 - mplayer dvb ://
 - Audio Issues
 - AC-3 or HE-AACv2 audio tweaks
 - Wrong audio channel
 - Video Issues
 - Performance – HD MPEG-2
 - Performance – HD H.264



Performance

- Software Decode
 - MPEG2 generally works
 - FFMPEG + H.264
 - Slice based decoding vs thread based
 - Fast CPU Required
- HW Acceleration of MPEG2 + H.264
 - XvMC
 - VDPAU
 - VA-API
 - XvBA



Analysis

- DVB – More than just A/V streams
 - PIDs identify the different data streams
- Use dvbsnoop for indepth analysis
 - pidscan to identify all pids
 - signal to check signal strength
 - Decoding of individual pids



DVB-PIDS

- 0 - Program Association Table (PAT)
 - Identifies the PIDs for the PMT entries
- 16 - Network Information Table (NIT)
 - Identifies the channels that make up a network
- 17 - Bouquet Association Table (BAT)
 - Channel name and LCN
- 18 - Event Information Table (EIT)
 - OTA EPG information
- ??? - Program Map Table (PMT)
 - Maps a channel to the A/V pids.



End Game

- Works for you
 - PVR
 - MythTV
 - VDR
 - Live TV
 - Mplayer
 - VLC
 - Xine
 - etc..



Links

- wscan
 - http://edafe.org/vdr/w_scan/
 - http://wirbel.htpc-forum.de/w_scan/index2.html
- dvbsnoop
 - <http://dvbsnoop.sourceforge.net/>
- Linux TV Wiki
 - http://www.linuxtv.org/wiki/index.php/Main_Page



Open Forum



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