



# Satellite TV & Linux

# Geostationary Satellites

- We want the satellite to stand still
- But the earth is rotating at 1 revolution per 24H
- So we want the satellite to move with us
  
- Some physics:  $GmM/r^2 = mw^2r \rightarrow r = 36,000$  Km  
(earth radius is only 6,000 Km)
  
- All satellites are located above the equator, which is South of Israel
- positions are longitude e.g. 13E, 4W, 7W etc ...

# Satellites Dish



- A dish, is a hyperbolic shaped reflector (mirror), concentrating incoming radio waves at it's focus
- This is similar to taking a magnifying glass and focusing the Sun's light at a spot
- An LNB (low noise block) is located at the dish's focus
- Prime vs. offset dish

# LNB - Low Noise Block

- The LNB is comprised of:
  - Dipole antenna – The actual antenna
  - Low Noise Amplifier – Amplify the signal before “catching” noise is from the electronics.
  - Frequency Down conversion – Convert to Frequencies that can be transferred via coax without being attenuated too much
  - Quad LNB. Monoblock LNB, multiple LNBS



# Diseqc – Digital Satellite Equipment Control

- Diseqc 1.0 – connects to 4 LNBS
- Diseqc 1.1 – connects to 4 Diseqc 1.0
- Diseqc 1.2 & 1.3 – mobile dish
- Diseqc 2.x – same as 1.x but bidirectional

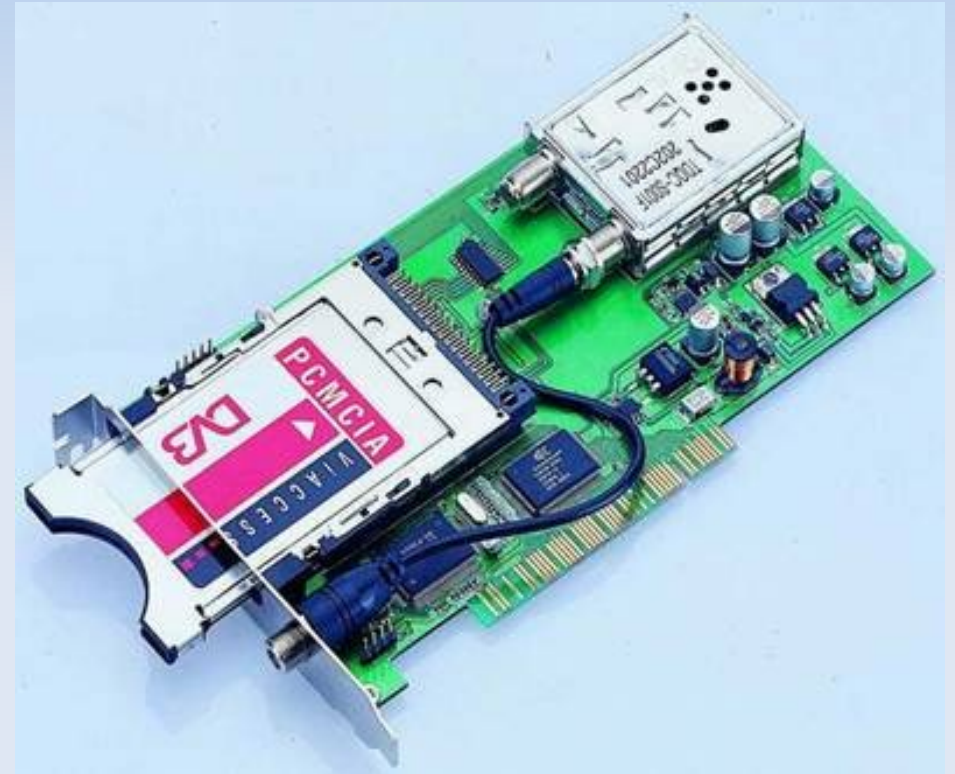


# Transponder

- Required information:
  - Frequency
  - Symbol Rate (SR)
  - Polarization
  - FEC (can be set to auto)
- May have many channels
- Statistical Multiplexing
- Feeds

# Encryption / Conditional access

- CSA (Common Scrambling Algorithm)
- CAM (Conditional access module)
- FTA (Free To Air)
- Smart Card



# DVB-S Vs. DVB-S2

- DVB-S: QPSK (4PSK), TRELLIS, MPEG2
- DVB-S2: 8PSK, LDPC, H-264. introduced to support HD. (though HD is possible via DVB-S)
- DVB-T, DVB-H, ATSC etc ...

Due to "political issue" DVB-S2 development was forked and stalled. There were many half baked branches.

- About 6 months ago, there was a decision to create a new API: S2API. It was merged into kernel 2.6.28

# Israel's Upcoming DVB-T

- AFAIK:
  - H264 – not supported by regular DVBT STB
  - Channels: 1,2,10,33,99
  - Channels 9 & 23 not included (politics ?)
  - Will indoor antenna suffice ?
  - Probably commence on July 2009

# Software

- Drivers – depends on adapter, may be built in into kernel. There is also a loopback device.
- VDR – as close as can be to a real STB.
- MYTHTV – full blown HTPC. Distributed.
- Kaffeine – KDE app
- Cmdline – use your favorite media player via /dev/dvb

# VDR

**MBC2**

**VDR**

**Tue 17.02.2009 16:00 - 18:00**

## **THE LAST SIGN**

**Kathy is tormented by the ghost of her abusive, alcoholic husband she must come to terms with her past if she is to find peace and love. Drama- Andie MacDowell / Samuel Le Bihan**

Record

Tue 17 02 16:49

# VDR

## Schedule - MBC Action

VDR

Tue 17 16:00	*	PRISON BREAK
Tue 17 17:00		BUFFY THE VAMPIRE SLAYE
Tue 17 18:00		LAW & ORDER
Tue 17 19:00		TNA XPLOSION
Tue 17 20:00		THE UNIT
Tue 17 21:00		ONG-BAK
Tue 17 22:40		ON THE EDGE
Tue 17 23:10		LAW & ORDER
Wed 18 00:10		THE UNIT
Wed 18 01:00		DETENTION
Wed 18 02:30		TNA XPLOSION
Wed 18 03:20		ON THE EDGE
Wed 18 03:50		AMERICAN GLADIATORS
Wed 18 04:30		LAW & ORDER

Record

Now

Next

Tue 17 02 16:50

# Myth - Main

main

**Watch TV**

Media Library

Manage Recordings

VDR

Information Center

Optical Disks



Tue Feb 17, 16:32

mythTV

# Myth – Watch TV

FAR AND AWAY

7

16:00-18:30 (150 minutes)

16:56

MBC MAX

A young man leaves Ireland with his landlord's daughter after some trouble with her father, and they dream of owning land at the big giveaway in Oklahoma ca. 1893. Adventure- Tom Cruise/Nicole Kidman

Browsing

لدي مال ولكنني على شكل ملاحق

# Myth – Watch TV



Paused

1:04 of 1:26



أنت منزج لان ما أخستاك عند صبح

# Myth – Weather

## Three Day Forecast

02/17/2009...

Tel Aviv, Israel

**Tuesday**



**High** 17°C  
**Low** 8°C

**Wednesday**



**High** 19°C  
**Low** 10°C

**Thursday**



**High** 24°C  
**Low** 13°C

Updated Tue Feb 17 17:42:39 2009

# Myth – Program Guide

MBC2 SHATTERED GLASS

16:36

Not Recording

The true story of journalist Stephen Glass who quickly rose from a minor writing post in Washington, to a freelance feature wri...

17/2	17:30	18:00	18:30	19:00
1 CH 1	< כך היה בפוליטיקו	מהדורה מקומית	מאחורי הקלעים	מדד יומי
2 ch 2	עושים סדר		שש עם	מה קורה
3 ch 10	< חמש בערב עם	ו )	אהרוני ואני	לונדון את קירשנבאון >
4 MBC2	< THE LAST SIGN	SHATTERED GLASS >		
5 MBC4	< DR PHIL	THE DOCTORS		OPRAH WINFREY SHOW >

# Mythweb - Listings



MythWeb: Tue Feb 17, 2009, 03:21 PM

Original   (Advanced)

MythTV: [Listings](#) | [Searches](#) | [Recording Schedules \(Manual, Custom\)](#) | [Upcoming Recordings](#) | [Recorded Programs](#) | [Backend Status](#)

Currently Browsing: Tue Feb 17, 2009, 06:15 PM

Jump To:

	06:15 PM	06:30 PM	06:45 PM	07:00 PM	07:15 PM	07:30 PM	07:45 PM	08:00 PM	08:15 PM	08:30 PM	08:45 PM	09:00 PM
1 CH 1	מהדורה מקומית	מאחורי הקלעים	...	מדד יומי		ישראל בחרת				דד ליין		מבט
2 ch 2	שש ענף			מה קורה		חדשות: תכנית חיסכון		חדשות				המפורסמים באים
3 ch 10	אהרונם ואני			לונדון את קירשנבאום				10 חדשות				ראש בקיר ...
4 MBC2	SHATTERED GLASS						DEMOLITION MAN					
5 MBC4	THE DOCTORS			OPRAH WINFREY SHOW			AL HELM AL DAE'E			WA TAMDY ALAYAM		
6 MBC Action	LAW & ORDER			TNA XPLOSION			THE UNIT			ONG: ...		
7	FAR AND AWAY	CHEAPER BY THE DOZEN					UNDERCOVER BROTHER					

Find:      Match case

# Mythweb - Schedule

MythTV: [Listings](#) | [Searches](#) | [Recording Schedules \(Manual, Custom\)](#) | [Upcoming Recordings](#) | [Recorded Programs](#) | [Backend Status](#)

3

ch 10

לונדון את קירשנבאום

Tue, Feb 17, 07:00 PM to 08:00 PM (60 mins)

י'רון לונדון ומוטי' קירשנבאום בתוכנית אירוח יומית, עם הזווית המעניינת של אירועי היום.

Category: Unknown

Type: Unknown (68239791)

Original Airdate: 2009

Length: 1 hr

Playback Group: Default

MythTV Status: **Never Record**

Possible conflicts:

Filters

חדשות 10

- Current Recording
- Earlier Showing
- Previous Recording
- Will Record
- Conflicts

More: [Search IMDB](#)

[Search TV.com](#)

[Search Google](#)

[Find other showings of this program](#)

[What else is on at this time?](#)

## Schedule Options:

- Don't record this program.
- Record only this showing.
- Record this program in this timeslot every day.
- Record this program in this timeslot every week.
- Find and record one showing of this title.
- Find and record one showing of this title each day.
- Find and record one showing of this title each week.
- Record at any time on channel ch 10.
- Record at any time on any channel.

## Advanced Options: (Hide)

Recording Profile:

Transcoder:

Recording Group:

Storage Group:

Playback Group:

Recording Priority:

Time Stretch Default:

Duplicate Check method:

Check for duplicates in:

# Software

- VDR – as close as can be to a real STB. can be used with soft-device. Has many plug-ins. (but no Hebrew subtitles AFAIK).
- MYTHTV – full blown HTPC. Distributed, Harder to install...
- Kaffeine – KDE app
- Cmdline – use your favorite media player
- Both myth/vdr can record multiple channels on same transponder

# Linux Based STB

- There are a few Linux Based receivers on the market.
- Dreambox is the popular choice – popular enough to be a target for copies ...
- Features like time shifting. (modules without a hard-drive requires an external NFS server)
- Some software images supports only original Dreamboxes (there are rumors about bricking the non originals).
- Original and alternate firmwares

# EPG – Electronic Program Guide

- Some channels have On-line EPG
- TV\_GRAB\_\* :  
Perl based scripts, which downloads EPG from different Internet sites, and converts them to an XMLTV format
- tv\_grab\_dvb – may be used for cross source eit.

# Websites

- [www.lyngsat.com](http://www.lyngsat.com) - info: sat, freq, chans, etc...
- [www.dvbsupport.net/freetv.html](http://www.dvbsupport.net/freetv.html) - free TV
- [www.sat-israel.com](http://www.sat-israel.com) - פורום הלווינים הישראלי
- [www.mythtv.org](http://www.mythtv.org) - mythtv
- [www.cadsoft.de/vdr](http://www.cadsoft.de/vdr) - vdr
- <http://dvbn.happysat.org/viewforum.php?f=17> - Linux specific sat forum, discussions on many issues, HD (VDP AU), patches to vdr/myth/kaffeine, etc ...

# Hardware issues

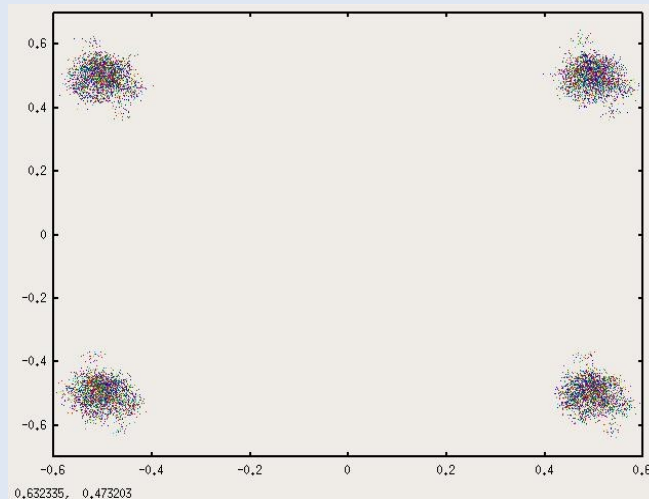
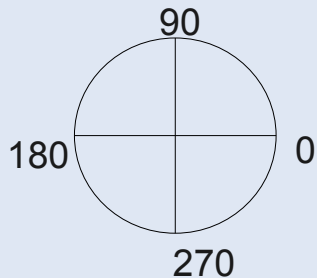
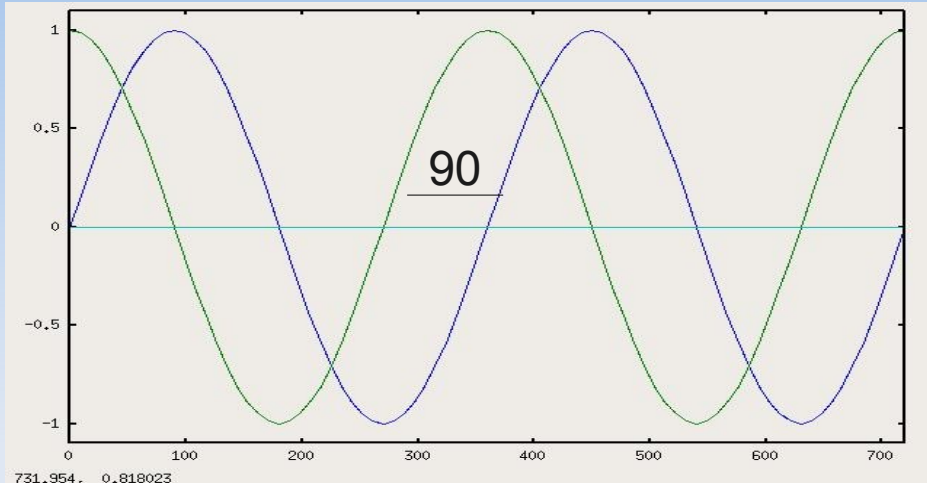
- NVIDIA Vs. ATI
- NVIDIA's VDPAU (Video Decode and Presentation API for Unix) offload portions of the video decoding/post-processing to the GPU.
- SS2 (DVB-S), S2-3600 (USB. Problems ?),
- FULL HD
- interlaced

# Before you buy

- PC Hardware: GPU (VDPAAU, 8400gs vs. newer, vc1), DVB-Card (Budget/FF), display, lirc.
- STB (FTA only ?)
- Which satellites (num, size, and mobility of dishes. Num LNBS).
- Is South (SE/SW) blocked ?
- How many TVs

# Modulation: PSK

(Just for general knowledge)



QPSK / 4PSK / QAM-4

- A Sine wave is transmitted, its phase holds the information
- 4PSK (QPSK) – 4 options (2 bits/sym): 45, 135, 225, 315
- 8PSK – 8 options (3 bits/sym): 0, 45, 90, 135, 180, 225, 270, 315

# Error correction

(Just for general knowledge)

- Convolution code. Aka Trellis:  
Not all sequences of data are valid, choose the "path" that is most probable.
- LDPC – low density parity check. For Each group of data bits, a sum is calculate. Each bit is a member of more than one group. In case of contradiction between bits and sum, the error can be corrected using other sums.



# Satellite TV & Linux

## The End